RAILROAD GAZETTE

FRIDAY, NOVEMBER 17, 1876.

THE UNITED STATES INTERNATIONAL EXHIBITION.

XVI.

MISCELLANEOUS.

Continuing the notes on miscellaneous objects in the Exhibition, the CORLISS BOILERS come next in order. These were located in one of the separate buildings erected for the purpose adjoining Machinery Hall. The boilers are of the vertical type, 14 ft. 6 in. long and 4 ft. in diameter with tubes 3 in. in diameter extending through their whole length and fastened to the two heads. The boilers are encased in brick-work with a fire-box or furnace underneath the lower end and a flue or fire space around the outside, extending part of the way up the outside of the boiler. There are twenty of these boilers arranged so that they can be worked in pairs.

CHAS. D. SMITH, whose address we did not get, exhibits in one of the boiler houses his improved "boiler setting," of which he shows a model, and which seems to consist of a series of water tubes under the boiler and at the sides of the fire-box, which are therefore exposed to the fire and smoke. The inventor says of this that "it is the *only* setting in the world that saves what *everybody* else *wastes*, guaranteed to save from 15 to 75 per cent.," which latter statement it is earnestly hoped is true; but of which, alas! such is the skepticism of human nature, we are very doubtful.

J. B. HOYT, of No. 28 Spruce street, New York, exhibited in one of the boiler houses his furnace for the combustion of bituminous coal and the prevention of smoke. This consists of an oven of fire brick in which the coal is burned. It is arranged with openings on each side, through which the coal is fed to the fire, the object being to expel the gases from the coal before it reaches the grate. This is done by feeding the fire through the openings in the side of the oven. These each hold a small quantity of coal from which the gas is expelled, after which the coke remaining is pushed on to the grate, and the space it occupied is filled by a fresh charge of coal. Air is admitted above the fire to consume the gases. The air, however, is heated by passing through suitable flues before it enters the furnace. The whole arrangement seems to be a very good one, and after making a series of careful experiments on one of these furnaces Mr. Theron Skeel, Mechanical Engineer, of New York, drew the following conclusions: "It appears that while for the combustion of *semi-bituminous* coal the Hoyt furnace only offers a simple and efficient means for the prevention of smoke, and does not offer any advantage in economy over the ordinary furnace with slow combustion and great skill in firing, and only offers an advantage of 7 per cent. over the ordinary furnace with rapid combustion and ordinary firing, yet for the combustion of the highly bituminous coals of the Western States, such as American cannel, it not only offers an efficient means of *entirely preventing smoke* in the burning of these coals, but renders an increased economy of 13 per cent. over that obtained in the ordinary furnace with very slow combustion and the most skillful firing, and an increased economy of about 30 per cent. over that obtained with rapid combustion and only ordinarily skillful firing." It must be remembered that this is the statement of an engineer, accustomed to be guarded in what he says, and whose utterances have solid ground to rest upon, and are therefore very unlike the "claims" of irresponsible inventors.

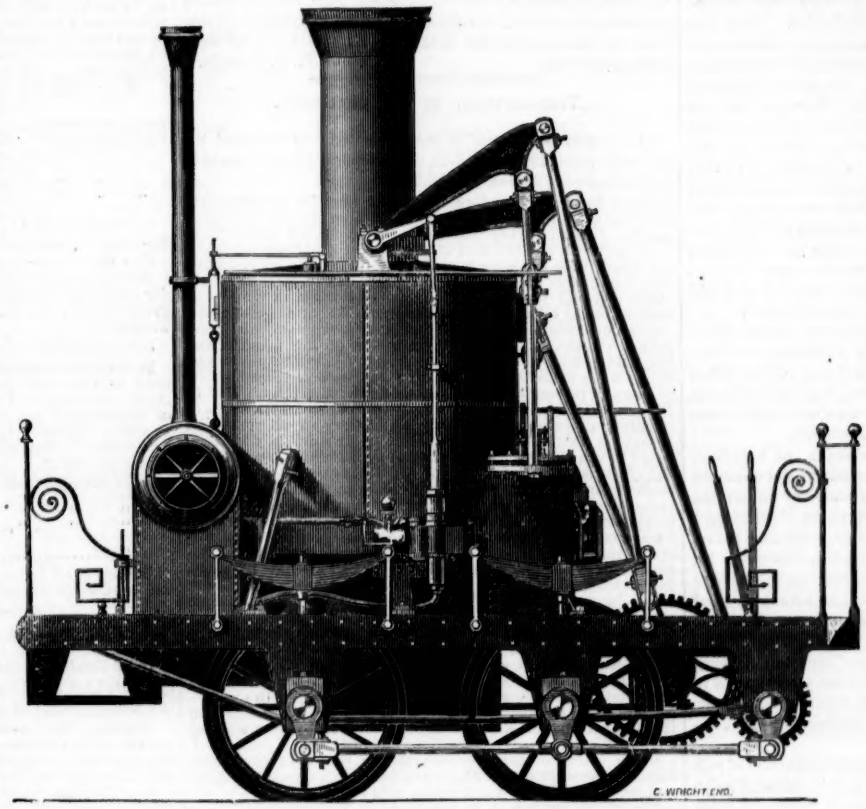
W. & J. GALLOWAY & SONS, engineers, of Manchester, England, had a number of their boilers at work in one of the boiler houses, and they also exhibited a model and some of the detached parts in Machinery Hall. These are large cylindrical flue boilers, one of the peculiarities being the use of transverse conical water tubes, which are placed inside of the main flues. These are directly exposed to the currents of gas and smoke, and thus increase the efficiency of the boilers. We were unable to get any detailed information about them excepting that announced on a placard over the boilers, which stated that "they are each 28 feet long and 7 feet diameter, and each boiler is capable of supplying steam to drive a condensing engine indicating 300-horse power."

Ross' ten-ton steam derrick is exhibited on the outside of one of the boiler houses. Who Ross is, or where the derrick was built, was not made known to the public.

In Annex No. 2, a building located in an out-of-the-way place, so that comparatively few visitors ever found it, were located a number of very interesting machines. Among them was an emery surface-grinding machine by J. H. STERNBERG, of Reading, Pa. It consisted of an ordinary iron planer with an emery wheel attached to the tool-post or head. The work to be ground is attached to the planer bed or table, and the machine is then set in motion, and the emery wheel at the same time is made to revolve very rapidly by an overhead counter-shaft. The object to be ground thus passes slowly back and forth under the emery wheel, while the latter is moved slowly sidewise by means of the ordinary tool feed-motion. The plan has frequently been used, but seems in this case to be well worked out.

PLUMB, BURDICT & BARNARD, of Buffalo, N. Y., exhibited one of their bolt-forging machines, and also a furnace for heating the iron from which the bolts are made. It was shown at work and certainly turned out very excellent specimens of bolts. It was, however, impossible in the time that was available to examine its construction critically, but we can say that there was a very gratifying absence of the rickety, clattering attachments which ordinarily seem to be an essential part of bolt-making machines.

C. MERRILL & SONS had one of their drop hammers at work and showed specimens of their work; WM. SELLERS & Co. had one of their well-known steam hammers; FERRIS & MILES, two of their hammers of different sizes; the KEYSTONE FORGE CO., of Philadelphia, a variety of their portable forges; the BRADLEY MANUFACTURING CO., of Syracuse, N. Y., one of their cushioned hammers; H. H. SCOVILLE, of Chicago, one of J. C. Butterfield's atmospheric hammers; S. C. FORSAITH & Co., of Manchester, N. H., one of Abbe's bolt headers; F. L. & D. R. CARNELL, of No. 1844 Germantown avenue, Philadelphia, a small steam hammer.



THE BALTIMORE & OHIO LOCOMOTIVE ENGINE.

As Manufactured by Gillingham & Winans, B. & O. R. R. Company's Mt. Clare Depot, Baltimore, Md.

"The characteristics of this engine are: 1. The use of anthracite coal as fuel. 2. The vertical tubular boiler. 3. The use of adhesion of all four wheels. The boiler is competent to supply steam to work up to the adhesion of all the wheels at the rate of ten miles an hour, or to produce a continuous horizontal pull of 2,322 lbs., equal to drawing 211 tons on a level road at the rate of ten miles an hour, as determined from actual experiment. See 9th Annual Report of B. & O. R. R. Co., p. 79. This engine has drawn, exclusive of its own weight, 17½ tons up an ascent of 200 feet per mile for 2,150 feet at the uniform rate of 6 miles per hour. See Report of Committee of City Council of Baltimore, March 24, 1836. The weight of this engine varies from 7 to 8¼ tons."

THE TUBULAR BARROW TRUCK MANUFACTURING COMPANY, of No. 169 Fourteenth street, Jersey City, exhibited three small steam hammers which, they say, are the "cheapest and simplest steam hammers" in the world. The hammer consists of an ordinary cylinder attached to a wooden post, and the anvil resting on a foundation separate from the post.

THE HULL & BELDEN COMPANY, of Danbury, Conn., showed the "dead-stroke power hammer," and also a drop hammer; JOHN F. ALLEN, of New York, a portable pneumatic riveter. Both steam and water pressure have been used for driving rivets, but this is the first case which we have seen of air pressure being used. It is said that these machines can drive four or more ¾ in. rivets per minute, either inside or outside of a boiler. The address of the inventor is One Hundred and Thirty-seventh street, near Third avenue, New York.

OTIS T. BEDELL, of No. 83 Reade street, New York, had "Rapid-Transit" screw wrenches exhibited in a neat case, which seem to be what is claimed for them.

MCNAB & HARLAN, of No. 56 John street, New York, exhibited all kinds of brass and steam-pipe fittings, oil cups, steam whistles, gauge cocks, water gauges, valves, cocks, etc. These were shown in two large and beautiful cases.

J. M. KING & Co. and HOLROYD & Co., of Waterford, N. Y., showed taps and dies.

THE BILLINGS & SPENCER CO., of Hartford, Conn., exhibited drop forgings of all kinds, handles, levers, wrenches, ratchets, stocks for screw-cutting lathe, dogs, hooks, etc. These are beautiful specimens and show the perfection to which this kind of forging has now reached. The result will inevitably be that wrought iron will be used where heretofore cast iron has been exclusively employed.

MERRIS L. ORUM, of Philadelphia, exhibited his flexible mandrel for bending metal pipe. The readers of the *Railroad Gazette* have been made familiar with this through the advertising pages. He also exhibited a table for holding the pipes while bending them. This is supplied with suitable rollers, which form the curve of the pipe.

THE EMPIRE PORTABLE FORGE COMPANY, of Troy, had an assortment of its forges.

THE BRIDGEWATER IRON CO., of Bridgewater, Mass., announced on an ornamental sign-board, that its works were established in 1810, incorporated in 1825, and re-incorporated in 1874. It exhibited seamless drawn copper and brass tubes, forgings, including shapes for locomotive frames, pinch-bars, crank-pins, connecting-rods and crank-axles. One of the latter, in its finished state, is exhibited and is a beautiful specimen of work.

JAMES FLOWER & BROS., of Detroit, Mich., exhibit their patent stop valve for "steam, water or gas," patent fire-hydrants, oil-cups and other brass fittings, and Stephenson's oil cup for locomotives.

THE AMERICAN TUBE WORKS, of Boston, were represented by a beautiful display of brass and copper tubes. It is difficult to know the merits of such an exhibit without some means of getting information, so that all that can be said here is that they looked well. This company was the original manufacturer in America of seamless drawn brass and copper tubes.

THE CRESCENT TUBE WORKS, Evans, Dalzell & Co., of Pittsburgh, manufacture iron tubes. They had a large display of their goods and showed specimens of tubes from 3-32 up to 10 in. diameter, and have specimens twisted and tied up into knots of the most difficult forms.

THE LUDLOW VALVE MANUFACTURING COMPANY, of Troy, N. Y., was represented by a great variety of its valves, of various sizes and forms.

THE WEST POINT FOUNDRY COMPANY, whose office is at No. 30 Broadway, New York, exhibited Hornig's shearing machine, of which they are the manufacturers.

J. E. MITCHELL, No. 310 York avenue, Philadelphia, whose business he announces to have been founded in 1810, exhibits a Tuscan column formed of 38 varieties of grindstones used in the mechanic arts. These stones are finished by patent stone-cutting tools patented by Mr. Mitchell. The whole exhibit is very attractive, but we are inclined to believe that it did not have the effect of disseminating much information about grindstones or the business in which Mr. Mitchell is engaged, which after all should be the chief end aimed at in such an exhibition.

THE ONEIDA STEAM ENGINE AND FOUNDRY COMPANY, of Oneida, N. Y., had a variety of "Westcott's combination chuck" and the "little giant drill chuck." These tools are very extensively used, and quite a respectable "paper" might be written about them.

THE E. HORTON & SON COMPANY, of Windsor Lock, Conn., showed a great variety of the "Horton" chuck. These are of various sizes, from those large enough to take a 36 in. car wheel to those small enough for drills.

THE CHAPMAN VALVE MANUFACTURING COMPANY, of Boston, exhibited valves of different sizes, up to those large enough for a pipe 12 inches in diameter; GEO. L. CUMMINS, No. 140 Centre street, New York, patent grindstone frames of excellent design, and provided with tool rest and shield to prevent the water from being thrown off the stone by centrifugal force; THE WICACO MACHINE AND SCREW WORKS, No. 505 Cherry street, Philadelphia, a neat case of tools, including mills, counterborers, punches, dies, etc.

MORRIS TASKER & Co. [LIMITED], of Philadelphia, erected a structure for the display of their goods which is hard to describe. The roof or covering, which formed a sort of dome, consisted of an enormous soap kettle coil of pipe. This was supported on columns consisting of clusters of iron pipes. The principal articles manufactured by this firm are wrought-iron and steel boiler tubes and water and gas pipes. The boiler tubes exhibited varied in size from 1 in. to 12 in. diameter and several specimens were 30 feet long, one of them 8 in. diameter. The steel boiler tubes vary from 1 to 6 in. in diameter. We could get no information of the relative strength of the steel and iron tubes. The former are made just as heavy as the latter, although probably they are much stronger. Some experiments showing the relative strength of each when subjected to internal and also to external pressure would be interesting and useful, and could easily be made by the manufacturers. Other exhibits of this firm were gas and water pipe varying in size from ⅛ to 12 in. in diameter, plain and galvanized, and also rubber-coated for protection against the action of water; heavy hydraulic pipe to resist great pressure, and coil pipe made of a very superior quality of iron. The rubber-coated pipe is a comparatively new article of manufacture, and is said to answer its purpose very well. An assortment of all kinds of gas, steam and water tube fittings, of which this firm are large manufactures, were shown, among them globe valves

from 3 to 20 in. in diameter; also two screwing machines for cutting screws on pipes, one for sizes up to 2 in. diameter and the other up to 8 in. This firm also take great pains to maintain the accuracy of their screw threads for pipes, and for this purpose have a complete set of gauges for both male and female screws.

A very curious machine which they exhibited was a centrifugal dryer for cleaning waste, rags, etc. The materials to be cleaned are first boiled in water with soda or other substance added, so as to separate the oil from the waste or rags. They are then put into the dryer, and in a few minutes the oil and dirt are almost entirely separated from them. The machine is similar to a centrifugal sugar dryer, and consists of a revolving cylinder made of wire cloth or perforated sheet metal. This is made to revolve at a very high speed, and the waste or rags being first placed in it, the water and oil are expelled through the perforations of the cylinder by the centrifugal force produced by the revolution of the cylinder.

C. SCOFIELD & Co., of Vineland, N. J., showed Scofield's shafting straightener. This consists of what might be called a pair of clamps whose section resembles that of two letter Vs placed like this: <>. These clamps are placed on the shaft to be straightened either in its position on the hangers, in the lathe or elsewhere, and it then rests against bearings near the ends of the clamps. The pressure to straighten the shaft is produced by a screw at the apex, as it may be called, of one of the clamps, and midway between the bearings. The tool looks as if it might be very useful where much of this kind of work must be done.

POOLE & HUNT, of Baltimore, had on view large turbine wheels, pulleys, hangers, etc., of various kinds. They also have some very neatly designed small stationary engines with 7×12 in. cylinders, and several feed-water heaters and pumps which are very compact and ingenious. The pump is operated by a crank attached to a shaft which is driven by a belt and pulley. These are mounted on top of a hollow column or stand which forms the heater. This is connected with the exhaust pipe by a branch, so that a portion only of the exhaust steam flows into the heater so as to heat the water to a temperature of about 200 degrees. The cold water is admitted in a small but continuous stream at the top of the heater, and flows over and through a series of discs, so as to be exposed as much as possible to the steam. The arrangement is very neat and compact, and looks as if it would be very efficient for the purpose for which it is intended.

The castings exhibited by this firm attracted especial attention, and were pronounced by competent authorities the best in the exhibition. Those composing the large turbine wheel which they exhibited were especially fine, and the workmanship and the neat way in which they were painted made them almost worthy to rank among the artistic exhibits.

THE YALE LOCK MANUFACTURING COMPANY, of Stamford, Conn.—From their exhibit, we learned what we did not know before, that this company is the manufacturer of the Weston differential pulley blocks and hoists, of which it exhibited a number of different kinds adapted to various purposes. It also exhibited two of Weston's iron derrick cranes, the one for 1½ ton and the other for 2-ton loads. The first was intended to be operated by hand and had a very ingenious arrangement of friction clutch operated by the crank, the latter acting as the brake lever. It would be impossible to describe this without an engraving. The whole crane was made of iron, the jib being a Phœnix column. The second or 2-ton crane was intended to be operated by power and had a friction lowering apparatus attached. It, and in fact all the objects exhibited by this company, were made entirely of iron.

A very ingenious adaptation of Mr. Weston's principle of pulley blocks is shown in a two-ton hoist. This is operated by an endless chain which if pulled on one side will hoist at a quick speed for loads of one ton or less, and if pulled on the other side will hoist at a slower speed for heavier loads. Another endless chain lowers the load by a self arrested safety brake and runs the hoisting chain up and down directly. In raising or lowering the operator can let go at any moment or change the speeds with the loads on, when hoisting. It would be impossible to explain the construction of this very ingenious contrivance without an engraving.

There is also exhibited a 1½-ton traveling crane with Weston's differential pulley block hoisting attachment. This is suspended or supported on a carriage or pair of wheels which run lengthwise on an I beam. The ends of this beam rest on other pulleys or carriages, so that the whole beam can travel transversely. These movements are effected by a very ingenious arrangement of wire ropes, to which motion is imparted by endless chains, which seem to be the never-failing resource of Mr. Weston.

Contributions.

Standard Sizes.

BOSTON, Nov. 13, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with a great deal of interest the article entitled "A Standard Car Axle," published in your issue of Nov. 10, and in that connection desire to make a few suggestions that may be of some interest to your readers.

I have no doubt that every car-builder or repairer appreciates the advantage of having a recognized standard for axles without further argument, and I would urge upon manufacturers of all kinds of articles, wherever it be possible, to agree upon standards of form and dimension. Suppose there were no two railroads of the same gauge, or suppose all makers of gas and steam pipes should make them and their connections of different dimensions, and you can appreciate something of the convenience of standards. And yet this same diversity exists among many articles of manufacture. I am told by architects that it is frequently impossible to design constructions in brick work until the maker of the brick is determined upon and the size determined, to say nothing of the commercial difficulty of not knowing how much one is purchasing when paying for 1,000 bricks. And even now there is considerable diversity among different makers of screw threads.

As the railroad, steamboat and telegraph bring the extremities of the world into more and more direct contact, the necessity of having an international system of measures, weights and coinage is more and more realized; and I think it is equally as important to possess common standards of form and dimension of all articles of manufacture possible. It is possible that the present standard car axle is not the best in every particular to the eighth of an inch; it is possible that the present recognized standard dimensions of gas pipe are not the best that human ingenuity could devise; and the same may perhaps be said of the regular sizes of rolled iron, sheet iron, tin plates, glass, paper, slate, nails and spikes, tacks, rivets, etc., etc.; but I submit that manufacturers and dealers are too wise to make any slight changes, if at the same time they would lose the common standard.

Probably it would be a great step forward if the dimensions of all standards could be expressed in denominations of the meter, so that they might become international as well as national. I would suggest that it would be eminently proper and of vast benefit if some scientific society or institution would appoint a committee to recommend standards for all possible articles of manufacture and their report after being approved by the society be submitted to the various governments for adoption, which finally would give such standards official sanction, which would cause them to be recognized as standards without, of course, compelling individuals to conform thereto except so far as they might consider it for their interest so to do.

E. H. HEWINS.

Transportation at the Centennial.

The "Press Committee" of the Exhibition has prepared the following summary of the work of transportation performed in connection with the late Exhibition:

There has been no more important question in connection with the great exhibitions of the world than that of transportation. It has in every instance been surrounded with difficulties; and both at Paris and Vienna those difficulties interfered materially with the success of the enterprise. In Philadelphia this subject was taken in hand at the earliest moment practicable, and the usual good judgment of those in power was evinced in the selection of Capt. Dolphus Torrey as Chief of the Bureau of Transportation. Capt. Torrey's large and varied experience in connection with the railroads of the country, and his administrative ability, insured every possible advantage being taken to secure rapidity, care and certainty, both in the delivery of passengers and goods. Capt. Torrey, as Chief of Bureau, commenced his duties early in 1875, and by a series of circulars to exhibitors, clearly explanatory of all necessary action on their part, prepared the way for a delivery of goods never before equaled in promptness and care. On the opening day (in broad contrast to that of all other exhibitions) a large majority of the articles were in their proper locations; the cases stored, and all in readiness for an equally prompt removal at the close of the Exhibition. That some idea may be formed of the magnitude of this undertaking, it has been estimated that the number of cases and packages amounted to between 40,000 and 50,000, with an aggregate weight of about 26,000 tons. The foreign commissioners have recognized the admirable management of this department by an unanimous expression of their satisfaction.

In the moving of goods within the grounds Capt. Torrey took advantage of all the new appliances for such purposes, and thereby secured a prompt distribution of all articles to their appropriate sections. Railroad tracks were laid not only from one building to another, but also *through* the principal buildings, so that goods shipped from extreme sections of the United States were at once placed in position without change of car.

It is a matter of much congratulation that this great work has been accomplished with proportionately a much less force and much more economically than ever before.

The official reports to be published by the Bureau of Transportation will contain all necessary details, and will be accompanied by illustrations and statistical tables.

PASSENGER TRANSPORTATION.

In this connection it is only necessary to state that the same management controlled the initial movement in this direction, as in relation to transportation of goods. Capt. Torrey took advantage of the occasion, and on July 5, 1875, an experiment was made to test the carrying capacity of the railroads running into Philadelphia, and also that of the city passenger roads. The result of this experiment proved that there was at that time a carrying capacity equal to nearly 150,000 persons, as that number were taken to the Centennial Grounds without difficulty on that day. Since then and during the period of the Exhibition, this number has been largely increased, and on what is known as the Pennsylvania Day there were at least 225,000 persons transported to and from the Centennial. When it is borne in mind that the bulk of this large number were delivered in a period of time not exceeding three hours, some idea may be realized of the remarkable feat performed under the head of passenger transportation; and when it is known, in addition, that there has been an average delivery of from forty to fifty thousand persons per day, and that there has not been a single accident during the entire six months, we may assuredly express the gratitude of the whole country at such wonderful results.

In this connection it is only just to refer to the admirable manner in which the railroad management centering in this city has co-operated in carrying out the most complete system of passenger transportation ever inaugurated in the world's history. In contradistinction to the results of all former International Exhibitions, the *bulk* of the visitors have been brought by rail, the most accurate data furnishing proof that not less than *three-fourths* of all the visitors were transported to and from the Exhibition in this manner. When it is also considered that this has been done without accident and with comparative rapidity and comfort, it must certainly stand unrivalled as the best evidence of the good management and executive ability connected with the American railroad system and organization.

TRANSPORTATION ON THE PENNSYLVANIA RAILROAD.

The work done upon this road has been so large that it is impossible to give at this early date any details, but the figures for the transportation of passengers to and from the Centennial Depot alone will aggregate at least *four millions*. The regularity of the arrival and departure of trains, the systematic method and celerity with which passengers have been deposited and taken away, have been the occasion of most favorable notice on the part of all foreign correspondents, who have not hesitated to hold up this road as an example for European railroads to take advantage of. In addition to the large number referred to above, who arrived at the Centennial Depot, it must be borne in mind that a very large number of Centennial visitors arrived at their depots at West Philadelphia, Kensington and Camden, which at a rough estimate would be computed at one million additional, thus making in round numbers a total of five million persons received and taken away from the city of Philadelphia in a period of six months' time. The largest number on any one day arriving at the Centennial Depot was on the 19th of October, when 33,919 were safely deposited within a few hours' time. On Oct. 26, there were 32,993, and on Sept. 28, 31,563. The result of this great work has been eminently satisfactory, and the management of the road have much reason for congratulation.

TRANSPORTATION ON THE PHILADELPHIA & READING RAILROAD.

This road, having a depot on the grounds, has had not only a populous section of the State to draw from, but also, through its local city lines, a large district from which it secured its daily travel. The following indicates the passenger traffic by this road to and from the Exhibition up to Nov. 1:

May 1876	169,296
June	307,503
July	306,081
August	388,970
September	801,819
October	810,000
Total	2,783,669

The largest number, on Sept. 28, Pennsylvania Day, was 185,800. It is much to the credit of the Reading Railroad that all of this business has been done, and this large body of visitors moved to and from without the occurrence of a single accident.

TRANSPORTATION WITHIN THE GROUNDS.

The large extent of the grounds occupied by the United States International Exhibition, and the distance of one building from the other, rendered it almost necessary to secure some convenient method of transportation; the result being the adoption of the narrow-gauge system. The track was laid so as to conveniently reach all of the buildings, and with the sidings is a little less than seven miles in length. The success of this road is a proof of the estimate in which it has been held by all visitors, as the following statistics will show:

Number of daily trains	8
" " trips per train	14

NUMBER OF PERSONS CARRIED.

From May 15 to 31	125,363
During the month of June	505,704
" " " " July	460,558
" " " " August	589,334
" " " " September	1,054,465
" " " " October	1,048,718
Total to Nov. 1	3,784,142
The largest number were carried on Sept. 28, Pennsylvania Day, viz	68,273

This railroad has been managed by a special corporation under the following officers: President, Dr. J. T. Hampton; Vice-President, R. W. Flower, Jr.; J. R. Mufflay, Secretary and Treasurer.

CITY PASSENGER RAILROADS, STEAMBOATS, OMNIBUSSES, ETC.

It has been simply impossible to obtain any details in reference to the number of visitors transported by the various means above referred to, but assuming that the total number of visitors paid and unpaid that have entered the Exhibition grounds represent 10,000,000, or twenty millions arriving and departing, the following may be considered as a somewhat approximate result:

Arrivals and departures by railroad	10,000,000
" " " horse cars	4,000,000
" " " all other conveyances	2,000,000
" " " on foot	4,000,000
Total	20,000,000

As soon as all the statistics upon these points are collected, it will be possible to come quite near the truth in this statement.

The New Nomenclature of Iron and Steel.

The following is the report of the International Committee appointed by the American Institute of Mining Engineers on the Nomenclature of Iron and Steel:

Whereas: The recent production of soft, cast, malleable compounds of iron by the Bessemer, the Siemens-Martin, and the crucible steel processes appears to demand a new nomenclature of iron compounds, for the following reasons:

1st. The term "steel," by which these soft products are commercially and professionally designated in England and in the United States, does not completely distinguish them from previously existing "steel" which would harden and temper.

2d. A nomenclature recognized in all languages seems desirable, as well for commercial as for scientific purposes, especially as law-suits, already commenced, depend on the meaning of the term "steel."

3d. Although homogeneity, due to fusion, is usually recognized and is by this committee recognized as the most definitive characteristic of both hard and soft steel, this quality may be equally well expressed in other terms, thus leaving the old term "steel," to define the malleable compounds of iron which will harden and temper:

Therefore resolved, That this committee recommends the following nomenclature:

I. That all malleable compounds of iron with its ordinary ingredients, which are aggregated from pasty masses, or from piles, or from any forms of iron not in a fluid state, and which will not sensibly harden and temper, and which generally resemble what is called "wrought iron," shall be called WELD-IRON (German, *Schweisseisen;* French, *fer soude*).

II. That such compounds, when they will from any cause harden and temper, and which resemble what is now called "puddled steel," shall be called WELD-STEEL (German, *Schweiss-stahl;* French, *acier soude*).

III. That all compounds of iron with its ordinary ingredients, which have been cast from a fluid state into malleable masses, and which will not sensibly harden by being quenched in water, while at a red heat, shall be called INGOT-IRON (German, *Flus-seisen;* French, *fer fondu*).

IV. That all such compounds, when they will from any cause so harden, shall be called INGOT-STEEL (German, *Flus-stahl* French, *acier fondu*).

(Signed), I. LOWTHIAN BELL,
P. TUNNER,
A. L. HOLLEY,
DR. HERMAN WEDDING.
RICHARD ACKERMAN,
THOMAS EGLESTON,
L. GRUNER.

General Railroad News.

ANNUAL REPORTS.

Indianapolis, Cincinnati & Lafayette.

This company works a line from Lafayette, Ind., southeast through Indianapolis to Cincinnati, O., 179 miles, with a branch from Greensburg, Ind., south 5½ miles to some large stone quarries. Of the main line 20½ miles, from Cincinnati

to the Indiana State line, is owned nominally by the Cincinnati & Indiana Company, nearly all of whose stock belongs to this company. The Greensburg Branch was built during the past year. There are 40¼ miles of sidings, of which 2,968 feet were laid during the year. The present report covers the year ending June 30, 1876.

The equipment consists of 17 passenger and 40 freight engines; 1 chair, 5 parlor, 35 passenger, 3 smoking, 2 postal and 11 baggage cars; 727 box, 49 stock, 66 coal, 289 flat and 25 caboose cars; 2 tool and 2 camp cars. One chair and one parlor car were added during the year; 30 flat, 6 box and 3 stock cars were built to replace old ones broken up.

The capital account at the close of the year was as follows:

Common stock	$5,587,150 00
Cincinnati & Indiana stock not owned	18,000 00
Preferred stock (new)	1,419,400 00
Total stock ($38,073 per mile)	$7,024,550 00
Bonds and extended coupons ($49,939 per mile)	9,213,705 79
Other liabilities	921,143 81
Total ($93,005 per mile)	$17,159,399 60

During the year $1,137,850 of the funded-debt bonds have been exchanged for new preferred stock, leaving $281,550 yet to come into the agreement. The bonds exchanged have been deposited wi h the trustees. The holders of the Cincinnati & Indiana second-mortgage bonds due next year have been asked to extend them till 1892, and many of them have agreed. Construction account has been charged with $72,761.14 for new sidings, excess of cost of steel over iron rails, Greensburg Branch, real estate and old accounts, and credited with $63,470.21 for stock and bonds cancelled, leaving a net increase of $9,340.75.

During the year 17 miles of steel and eight miles of iron rails were laid; there are now 44½ miles of steel in the Main Line. Large renewals of ties and bridges have been made.

The work done was as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Train mileage	1,365,855	1,334,035	Inc.. 31,820	2.4
Passengers carried	609,524	616,934	Dec.. 7,410	1.2
Passenger mileage	22,113,531	24,085,103	Dec.. 1,971,572	8.2
Tons freight carried	556,393	554,480	Inc.. 1,913	0.3
Tonnage mileage	52,465,909	52,677,120	Dec.. 211,211	0 4
Average rate per passenger per mile	2.700 cts.	2.720 cts.	Dec.. 0.020 cts.	0.7
Average rate per ton per mile	1.730 "	1.866 "	Dec.. 0.136 "	7.3
Average earnings per pass'ger train mile	$1.44	$1.54	Dec.. $0.10	6.5
Average earnings per freight train mile	1.70	1.95	Dec.. 0 25	12.8
Average expense per train mile, all trains	0.67	0.82	Dec.. 0.15	18.3

The earnings for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers	$603,937 28	$654,628 27	Dec.. $50,690 99	7.8
Freight	898,729 11	982,952 83	Dec.. 84,223 72	8.6
Express, mail, etc.	134,394 61	129,650 31	Inc.. 4,744 30	3.7
Total	$1,637,061 00	$1,767,231 41	Dec.. $130,170 41	7.4
Working exp'ses.	919 363 57	1,056,312 43	Dec.. 136,948 86	13.0
Taxes	44,599 49	39,938 66	Inc.. 4,660 83	11 7
Total	$963,963 06	$1,096,251 09	Dec.. $132,288 03	12.1
Net earnings	$673,097 94	$670,980 32	Inc.. $2,117 62	0.3
Gross earnings per mile	8,994 84	9,872 80	Dec.. 877 96	8.8
Net earnings per mile	3,643 33	3,748 49	Dec.. 105 16	2.8
Per cent. working expenses	56.16	59.77	Dec.. 3.61	6.0
Per cent. exp'ses and taxes	58.88	62.03	Dec.. 3.15	5.1

The reduction in expenses is due to decreased cost of labor and materials and to rigid economy. Owing to competition passenger trains have to be run at high speed, increasing the cost of maintaining the road. The pool on Cincinnati and Chicago business has worked well, but sharp competition has continued on Cincinnati and Indianapolis business. The local traffic was seriously affected by floods and poor crops. The Greensburg Quarry Branch has brought considerable business to the road and can be made a valuable connection by extending it 20 miles southward to the Ohio & Mississippi road.

The profit and loss account for the year was as follows:

Net earnings		$673,097 94
Interest on bonds and Cin. & Indiana stock	$654,541 67	
" " floating debt	34,723 67	
		689,265 34
Deficiency for the year		$16,167 40
Balance from previous year		22,762 29
Debtor balance at close of year		$38,929 69

During the year a controlling interest in the Harrison Branch was purchased, to be paid for out of the earnings of the branch. This was done to quiet title and to secure the business of the Whitewater Valley road. That road and the Cincinnati & Martinsville have passed out of the control of the company.

President Ingalls thinks that to work the road successfully all the funded-debt bonds must be converted into preferred stock, the Cincinnati & Indiana bonds extended, and the floating debt got rid of. The Lawrenceburg cut-off should be built and more steel rails laid.

A note appended to the report explains the inability of the company to pay the August interest, owing to decrease in earnings, and the subsequent appointment of Mr. Ingalls as Receiver, which we have heretofore noted. A plan of reorganization is being prepared.

Central, of Georgia.

The following is condensed from advance sheets of President Wadley's report for the fiscal year ending Aug. 31, 1876. The road worked for the year was the same as in the previous year and is as follows:

	Miles.
Central Railroad:	
Savannah Division, Savannah, Ga., to Macon	192.0
Atlanta Division, Macon to Atlanta	102.5
Augusta Branch (leased), Millen to Augusta	53.0
Eatonton Branch, Gordon to Eatonton	39.0
	386.5
Southwestern Railroad, leased:	
Macon, Ga., to Eufaula, Ala	143.0
Muscogee Branch, Fort Valley to Columbus	71.0
Fort Gaines Branch, Cuthbert to Fort Gaines	20 0
Albany Branch, Smithville to Albany	22.5
Blakeley Extension, Albany to Arlington	35.5
Perry Branch, Fort Valley to Perry	12.5
	305.5
Upson County Railroad, Barnesville to Thomaston	16.5
Total worked	708.5

The Savannah Division proper with the Augusta and Eatonton branches are known together as the Savannah Division, being 284 miles in all. The company also works the Vicksburg & Brunswick road, from Eufaula, Ala., to Clayton, whose earnings are not included; it owns one-half interest in the Western Railroad of Alabama from Columbus and West Point to Selma, the other half being owned by the Georgia Railroad Company; is substantially owner of a steamship line between Savannah and New York, and has a large amount invested in tributary and controlled lines, principally in the form of advances on coupons paid and for improvements made.

The earnings of the various lines for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Central Railroad, Savannah Div.	$1,384,891 13	$1,552,119 72	Dec. $167,228 59	10.8
Central Railroad, Atlanta Div.	560,112 82	555,262 96	Inc. 4,849 86	0.9
Southwestern Railroad	648,056 07	770,726 22	Dec. 122,670 15	14.6
Upson County Railroad	8,482 08	8,427 71	Inc. 54 37	0.6
Total earnings	$2,601,542 10	$2,886,536 61	Dec. $284,994 51	9.5
The expenses were:				
Central R. R., Savannah Div.	$792,708 05	$858,952 92	Dec. $33,244 87	4.0
Central R. R., Atlanta Div.	337,501 86	347,277 95	Dec. 9,776 09	2.8
Southwestern Railroad	478,684 79	504,129 00	Dec. 25,444 21	5.0
Upson County Railroad	9,106 17	9,344 83	Dec. 238 66	2.6
Total expenses	$1,618,000 87	$1,686,704 70	Dec. $68,703 83	4.1
Leaving the net earnings:				
Central R. R., Savannah Div.	$592,183 08	$726,166 80	Dec. $133,983 72	18.4
Central R. R., Atlanta Div.	222,610 96	207,985 01	Inc. 14,625 95	7.0
Southwestern Railroad	169,371 28	266,597 22	Dec. 97,225 94	36.8
Upson County R. R. (deficit)	624 09	917 12	Dec. 293 03	32.5
Total net earnings	$983,541 23	$1,199,831 91	Dec. $216,290 68	18.0
Central Railroad Bank	55,554 87	59,180 88	Dec. 3,626 01	6.1
Central Railroad Bank expenses	17,130 23	21,552 66	Dec. 4,422 43	20.5
Central Railroad Bank net	$38,424 64	$37,628 22	Inc. $796 42	2.1
Total net receipts	$1,021,965 87	$1,237,460 13	Dec. $215,494 26	17.4

The average results were as follows:

	Savannah Div.	Atlanta Div.	S. W. R. R.	U. C. R. R.	Total.
Gross earn. per mile	$4,876	$5,465	$2,121	$514	$3,672
Expenses per mile	2,791	3,293	1,567	852	2,284
Net earn. per mile	2,085	2,172	554	....	1,388
Per cent. of expenses	57.24	60.26	73.86	107.36	62.19

The expenses for the entire line the previous year were 57.81 per cent. of the gross earnings.

The reduction in earnings was partly the result of short crops and partly of low rates and excessive competition. The President is very much opposed to the policy of low rates and has done what he could to avoid it, but the board has believed it best to prevent serious diversion of business from the company's lines. As great a reduction as possible has been made in expenses, but previous economy has made it impossible to cut down much more.

After paying all interests, rents and other necessary charges a surplus of $437,235.83 was left, equivalent to 5.83 per cent. on the stock. No dividend was paid, however, this surplus being used in the paying of maturing debt, by which payment the value of the stock is increased. During the year the following bonds, for which the company was liable, matured and were paid:

Central Railroad, rebuilding bonds	$1,000,000
Steamship bonds	300,000
Macon & Western bonds	33,000
Southwestern Railroad bonds	55,000
Muscogee Railroad bonds	168,500
Mobile & Girard bonds, indorsed	205,000
" " " not indorsed	64,500
Total	$1,826,000

During 1877 only $4,000 Southwestern bonds will mature. The total amount of bonds maturing up to and including 1891 is $1,987,500. It has been resolved to limit the issue of the tripartite bonds (so called because issued jointly by the Central, the Macon & Western and the Southwestern companies) to $3,500,000, of which $3,222,000 have been sold, leaving $278,000 still unsold. The rest of the maturing debt will have to be provided for from net earnings.

The report refers to the recent decision of the United States Supreme Court limiting the taxation of the Central Railroad proper to that fixed by the original charter; this decision does not cover the Atlanta Division, as it was built under the charter of the Macon & Western Company.

Reference is also made to the resignation of Mr. Powers as Engineer and Superintendent of the Southwestern road to accept the office of General Commissioner of the Southern Railway & Steamship Association. His resignation was accepted with the understanding that, should he leave the Southern Association at any time, he will return to the Southwestern. The managers of the Central admit the necessity of that association, or one similar to it, and will sustain it as long as good faith is kept by the other members.

The company's interest in the steamboats on the Chattahoochie River has been reasonably prosperous, but the effort to establish a line on the Tombigbee has not been successful, owing mainly to the opposition of the Mobile & Ohio.

The partition of the two branches of the Western Railroad of Alabama has not been completed, and the report of that road is not yet ready for issue.

RAILROAD LAW.

Exemption of Land Grant from Taxation.

In the West Wisconsin Company against the Board of Supervisors of Templeton County, Wis., the United States Supreme Court has affirmed the decision of Supreme Court of Wisconsin that the lands granted to the company are not exempt from taxation. It is held that a well-grounded doubt of the intention to exempt is fatal in such cases; *prima facie*, every presumption is against exemption. It is only where the terms of the concession are too explicit to admit fairly of any other construction that it can be supported.

Liability for Injury to Passengers who are Wrongfully on the Train.

Gen. J. D. Cox, Receiver of the Toledo, Wabash & Western Railway, sends us copies of recent decisions of the Illinois Supreme Court (Justice Walker) in two similar and very peculiar cases. The facts seem to be that a man and a woman who claims to have been his wife, got upon the company's train without tickets, pretended to the conductor that they had no money (though they had, as the woman now confesses), and persuaded him to permit them to ride without paying, which, of course, under the rules of the company, which were known to the man, he had no authority for doing. Before reaching their destination the train met with an accident, by which the man was killed and the woman injured. She sued the company in two actions—one to recover for the killing of her husband; the other for her own injuries, and recovered in both in the Circuit Court. In the first suit the company contended that the woman was not married to the man with whom she was traveling, and part of the decision of the Supreme Court has reference to instructions in the lower court on the evidence concerning this. The important part of the decision to railroad companies is that fixing the liability of the company for injuries to persons who were on the train contrary to the reasonable rules of the company. It is as follows:

"It is urged that the Court erred in refusing to give the 9th or some one of the other of the instructions asked by plaintiff in error, but refused by the Court. That instruction asserts, that if deceased knew that the regulations of the company prohibited persons from traveling on the road without a ticket or the payment of fare, and if, after being so informed, he went on the train, and, by arrangement with the conductor, was traveling without a ticket or paying his fare, deceased, in such case, would not be a passenger and the company would not be liable for the negligence of their officers. In some form all of these refused instructions present this question.

"Defendant in error insists that this case is governed by the Ohio & Mississippi Railroad Company *vs.* Muhling (30 Ills. 9). In that case the passenger had been in the employment of the road, and was neither prohibited from getting on the train nor informed that it was against the rules for him to do so without a ticket or the payment of fare. Again, the company in that case seem to have owed the plaintiff for labor, which would have enabled them to deduct the amount of fare from the amount owing him. It was there said that if a person was lawfully on the train, and injuries ensued from the negligence of the employes of the company, the passenger thus injured might recover.

"On the part of the plaintiff in error, it is urged that railroad companies, being liable for the want of care of their officers by which their passengers suffer injury, they must have the power to make reasonable regulations for the government of their employes, and the power to enforce them. And that it is a reasonable regulation which prohibits persons from traveling upon their roads without purchasing a ticket or paying fare, and that a person going on their roads in known violation of such a rule, and inducing the conductor to violate it, is not lawfully on the road, and the company should not be held responsible for any injury received by such person. That where a person actively participates in the violation of such a rule, intentionally and knowingly, he does not occupy the same relation to the road as had he not known of the rules or done any act to induce its violation.

"It is manifest that if a person were stealthily and wholly without the knowledge of any of the employes of the company to get upon a train and secrete himself for the purpose of passing from one place to another, he could not recover if injured. In such a case his wrongful act would bar him from all right of compensation. Then does the act of the person who knowingly induces the conductor to violate a rule of the company, and prevails upon him to disregard his obligations to fidelity to his employers to accomplish the same purpose, occupy a different position, or is he entitled to any more rights? He thereby combines with the conductor to wrong and defraud his employers out of the amount of his fare, and for his own profit. In this case the evidence tends strongly to show that both defendant in error and her husband had money more than sufficient to pay their fare to Danville, and a considerable distance beyond that place. If this be true—and defendant in error swears they had—then they were engaged in a deliberate fraud against the company, no less than by false representations to obtain their passage free from Decatur to Danville, and thus defraud the company out of the sum required to pay their fare. In this there is a broad distinction from Muhling's case, as in that case there was no pretense of fraud or wrong on his part.

"The Court below should have given some one of the defendant's instructions, which announced the views here expressed.

"The evidence is not of the character to convince us that the judgment should stand, notwithstanding the erroneous instructions given, or the refusal to give proper instructions. We have no doubt that the erroneous instructions given misled the jury in giving their verdict. For the errors indicated the judgment of the court below must be reversed and the case remanded. Judgment reversed."

The facts in the second case, that in which the woman sued for injuries to her own person, were of course similar, except possibly as to the woman's being a party to the fraud on the company and cognizant of the rules prohibiting riding without paying fare. The following are extracts from the decision:

"On the trial in the court below the court instructed the jury that it did not matter whether defendant in error had a ticket or had paid her fare, and refused to instruct the reverse of this proposition.

"In the other case between these parties at the present term, it was held that it was material—that when a person knowingly induces the conductor to carry him without paying fare contrary to his instructions, it is a fraud on the company which precludes a recovery.

"She, however, denies that she knew of the regulations; but in this she is flatly contradicted by other witnesses. But, be this as it may, even if it were conceded that she was not informed, her husband was, and he was engaged in endeavoring fraudulently to procure her passage on the road without paying fare. He was her agent, and what he knew in reference to the matter is the same as if it had actually come to her knowledge. She cannot profit by the fraudulent acts of her husband. Had he, by fraud, acquired property for her and in her name, it is manifest that she could not have protected herself by pleading ignorance of his fraud, and thus hold the property, and in principle the two cases are alike. The court below erred in the giving these instructions for defendant, and in not giving their converse for plaintiffs in error; and the judgment of the Court must be reversed and the cause remanded. Judgment reversed."

Liability on a Check for Baggage.

In the case of Clayton against the Chicago, Rock Island & Pacific Company the Illinois Supreme Court held:

1. The delivery of a baggage check by a railroad company to a passenger is *prima facie* evidence that the carrier has received the baggage it represents, but such evidence may be overcome by proof to the contrary; but the burden of proof is upon the carrier to show a non-delivery.

2. It is immaterial when baggage comes to the possession of the carrier, whether at the time the check is issued, or at a subsequent time. In either case its liability as an insurer becomes fixed in case of a loss.

3. Where a railway company received a passenger's check for baggage, which had not then arrived by another road, and gave its own check for the same, and it appeared that it surrendered the passenger's first check to the other railway company, it was *held*, that this was sufficient, in the absence of proof to the contrary, to show that the baggage was received by the company so surrendering the first check.

A Mistake in Stations.

The Danbury *News* says: "The recent death of an old lady in Brookfield recalls a touching incident in her life, which took place a few years ago. She was going to Stamford to visit her daughter and took a seat in the cars for the first and only time in her life. During the ride the car in which she was seated was thrown down an embankment and demolished. Crawling out from beneath the debris she spied a man who was held down in a sitting position by his legs being fastened. 'Is this Stamford?' she anxiously enquired. The man was in considerable pain, but he did not lose sight of the fact that he was from Boston, so he answered: "No, madam; this is a catastrophe.' 'Oh!' ejaculated the old lady, 'then I ha'n't oughter got off here.' The man from Boston agreed with her."

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS:

	Page.
ILLUSTRATIONS:	
The "Grasshopper" Locomotive	499
Baltimore & Ohio Mogul Passenger Locomotive—facing	503
CONTRIBUTIONS:	
Standard Sizes	500
EDITORIALS:	
The Training of Engineers	502
Centennial Travel	503
Nos. 6 and 600	503
Foreign Railroad Notes	503
Record of New Railroad Construction	504
Grain Movement for Twenty-eight Weeks	504
EDITORIAL NOTES	504
GENERAL RAILROAD NEWS:	
Annual Reports	500
Railroad Law	501
Report of Car Service and Expenses	504
Elections and Appointments	504
Personal	504
Traffic and Earnings	505
The Scrap Heap	505
Old and New Roads	506
Train Accidents in October	507
MISCELLANEOUS:	
Transportation at the Centennial	500
The New Nomenclature of Iron and Steel	500

Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

THE TRAINING OF ENGINEERS.

The exhibits of various technical schools of this country and Europe at the Centennial, and the discussion on the *education* of engineers at a joint meeting of the Civil and Mining Engineers' societies have attracted more attention to this subject of late than perhaps ever before. It must be confessed that it has been worn somewhat threadbare of late, and it is believed that there is a general disposition on the part of experienced engineers to skip everything which they see in print relating to it. Nevertheless we will venture to say a little more about it, which may perhaps not be regarded by some as quite sound.

One of the great difficulties about the proper consideration of the subject is the sort of semi-romantic idea which is entertained very generally about the occupation of an engineer. The word itself is very euphonious and suggestive of magnificent possibilities, so that a person is likely to feel his importance very much more if he can print on his card "A. B. C——, *Engineer*," than he would if his card announced that Mr. A. B. C—— was simply a *machinist*, a *bridge-builder*, or a *stone-mason*. It was suggested in these pages not long ago that if we could rid ourselves and the English language entirely of the word engineer, it would be an advantage. We are still inclined to believe that such would be the case. Even if we could simply take away the euphony of the word, as for example, if we spelled it backwards, and Mr. A. B. C—— was to announce that he was a *Reenigne*, instead of an *Engineer*, Mr. A. B. C——, especially if he was a young man—would not think the occupation half as desirable if the sort of crescendo sound of his title were lost. It must, of course, be admitted that there is a difference, and a very important one, between the occupations which are classed under the head of engineering and those which are simply mechanical or manufacturing. Thus, makers of common road wagons are never—at least so far as we know—called engineers; but the manufacturers of threshing machines are often called agricultural engineers. Now to construct the one, only mechanical skill is needed, but with the other there must be a certain amount of scientific knowledge and ingenuity exercised in the design of the machines, and their operation involves a more or less complex sequence of cause and effect, requiring a superior order of intelligence to comprehend. Plenty of other illustrations might be quoted: a person who makes ratchet drills is a mechanic, but one who designs the better class of drilling machines is an engineer; he who builds a stone fence is a workman, but the constructor of a stone bridge is an engineer. The distinctive characteristic of the profession of engineering is the exercise of a superior order of intelligence in the design and construction of his work. It must be admitted, however, that the knowledge which is acquired from books bears a very small proportion to the other knowledge which an engineer learns in other ways. In fact, it would be a very easy mattter to name a great many very successful engineers the majority, perhaps—who had no scientific knowledge and no book education whatever when they commenced their professional career, excepting the three elementary acquirements of reading, writing and very little arithmetic. Now we have expressed our opinion too often and too strongly heretofore on the value of the training which education gives to make it possible for our readers to misunderstand our meaning. The education which comes from books is, however, only a small part of the professional knowledge which is required by an engineer, although a very important one. It is like the relation which salt bears to food. It is but a small part of the nourishment we take, but a very much needed one; and those who are obliged to do without it or to use a substitute may possibly maintain their health and strength but do so at a great disadvantage. If, however, any one should tell us that a diet of salt alone would make us "healthy, wealthy and wise," we would scoff at him. Now the knowledge which is learned from books and taught at schools bears a relation to that which must sustain an engineer in his professional career analogous to that which salt bears to his food. It is a very great disadvantage to be without either salt or education, and those who are without either crave them most; still a man can live physically without the one and professionally without the other, but none have ever lived without the more substantial "daily bread" for our bodies and our minds.

Now, the fault we have to find with some of the technical schools is, that for the training of engineers they are proposing a method of education which is a diet of salt. What is meant may be illustrated by a quotation from a circular distributed at the Centennial by some representative of the school whose curriculum is described It says: "The Practical Technological Institute of St. Petersburg is one of the highest technical schools now existing in Russia, and has capacity for five hundred students. It is divided into two departments, mechanical and chemical. The Mechanical Department prepares technical men for the management of mechanical workshops, and of the rolling stock on railroads. Owing to this, the Mechanical Department is divided into two special sections; one of them graduates engineers for the work-shops, and the other for the railroads."

Now we wonder whether any experienced railroad manager could be induced to believe that a student in such a school could be qualified for the duties he would be called upon to assume and fulfill in managing the workshops or the rolling stock of a railroad? Could a young man ever acquire at a school any just idea of the length and breadth and depth of the capacity of human nature for blundering? Could he conceive of the ingenuity which seems to be inherent in things and people to go and do wrong? Now exactly that sort of experience is among the first and most important information that a person must acquire, and a knowledge of which comes perhaps slowest. There seems of late to be a tendency to believe that all human knowledge worth knowing is contained in books, whereas the very reverse is the case: only a very small part of what is best worth knowing has ever been printed. As a matter of fact, books are always behind the times, and must necessarily be so, because they come after the knowledge and simply record what has gone before. It is so in every occupation. No one would ever undertake to conduct a business on the information acquired from books alone.

Then, too, there is that indescribable capacity, which can be acquired by experience alone, of dealing with things. Imagine a technical school graduate sent out, fresh from his books, to erect an iron or wooden bridge, to clear away a railroad wreck, or to make up a time table on a road with a complicated traffic. Or take a simpler case of his being consulted about the repair of a locomotive boiler which needed patching. The ability for doing such work can be acquired, like the Christian virtues, not by studying about them, but in the doing thereof; and it is that distinction which we think is lost sight of too much of late by the persons in charge of the schools.

In the life of Brassey, the celebrated English contractor, in speaking of the assistant engineers employed on work in Denmark, his agent, Mr. Rowan, says: "The great fault of Danish technical education is the overdoing of it. The young men are kept in school until they are twenty-five. They come out highly educated; utterly ignorant of the world, but educated to a tremendous height." The main point in which Mr. Rowan found these highly educated persons to be deficient was decisiveness. "They have been in the habit of applying to one of their masters for everything, finding out nothing for themselves; and the consequence is, that they are children, and they cannot form a judgment. It is the same in the North of Germany; the great difficulty is, that you cannot get them to come to a decision. *They want always to inquire and to investigate, and they never come to a result.*' Commenting on this statement the author of the life of Brassey says: There is great reason for thinking that of all the qualities which are needful for the wise conduct of human life, decisiveness is the one which can least afford to lie dormant. It soon dies away by inanition, if not exercised. Moreover it is very questionable whether it can be revived. Experience seems to show that if young people are not trained to decide, or at least not encouraged and allowed to exercise decisiveness, they will never be able to evoke this quality in after life when it is wanted. If this be so, it is a matter which requires the most serious consideration at the present time, when we are introducing a system tending to promote the laborious acquisition of knowledge at an early period of life; which system, however, as the opponents to it contend, may produce a well-instructed and docile, but, at the same time, an unthoughtful, unoriginal and undecisive race of men."

We have been led to write about this subject at this time by an editorial article in our able contemporary, the *Engineering News*, which quotes approvingly the following remarks from another paper, which says: "Unless this adult monopoly (of trades unions) can be broken up, there is little hope in our country's future, except in *industrial day schools, in which all the industrial arts can be more thoroughly taught* than they are in the usual demoralizing and unscientific training of apprenticeship."

Our contemporary then refers to the industrial schools of Europe, and says: "In Sweden, France, Russia and Italy are to be found such combined schools and workshops, where the trade is acquired and the education carried forward at the same time."

Now the question comes up, can the trade or the practice of engineering be successfully taught in such schools? We believe not, and believe that many of the schools are now falling into serious error in employing learned professors to teach what could be taught much more successfully by unlearned mechanics or workmen. A few days ago, while examining the very interesting exhibit of the Imperial Technical School of Moscow, at the Centennial, we met an experienced mechanic who has for years been the head of a successful machine shop, engaged in the same way. We asked him how much he would pay a workman who had served his apprenticeship in that shop? "Not much," he said. "The fact is," he remarked, "that a boy taught in such a school as that, with all the appliances furnished by the Imperial Government of Russia, would not know how to get along with the tools which he would find in ordinary shops."

The truth is, it is hard for a student who aspires after the high-sounding title of an engineer, after studying in an Imperial or a polytechnic school, to comprehend that his career is the very obscure one of converting bar iron into bridges, to keep out treacherous quick-sands or vicious clay from sliding into the hole which he has dug to lay a foundation in, or manufacture a machine which will do more and cost less than that made by his neighbor, and all the time be watching his pay-roll and balance sheet, keep the requisite deposit in bank to meet his notes, or else if employed in any kind of corporation work to see that the cost does not exceed the estimates, or that selfish contractors do their work faithfully. The qualifications which make an engineer successful in any field are usually very prosaic. These, as has been mentioned before, may be possessed by a person with only the rudiments of education, and are very much the same as those which must be possessed by any business man. Of all the successful manufacturing engineers in the city of Philadelphia, we doubt if there is one who is acquainted with differential and integral calculus, and if there is one, whether he ever uses it in his profession; and it is not believed that there are a half-dozen who know any more mathematics than a little algebra and less geometry. Their success nevertheless is assured. Now it is not said that they would not have been more successful if they had had the advantages of a better theoretical training. We believe their success would have been greater; what we want to point out is that the chief and most essential qualifications to enable a person to do or direct the doing of engineering work successfully are those learned, not from books, but in actual experience. It is the knowledge which the successful Philadelphia engineers have and the graduates of technical schools have not that is the most essential part of an engineer's training.

The actual competition of business, too, is one of the most powerful stimulants to exertion possible. The effect of this is that the ablest engineers are constantly competing with each other to devise new ways of doing their work and producing results at the least cost and in the most effective way possible. If, therefore, a student of engineering learns in such a school, he has an opportunity of studying the means evolved which insure success in actual practice. Now it must be remembered that

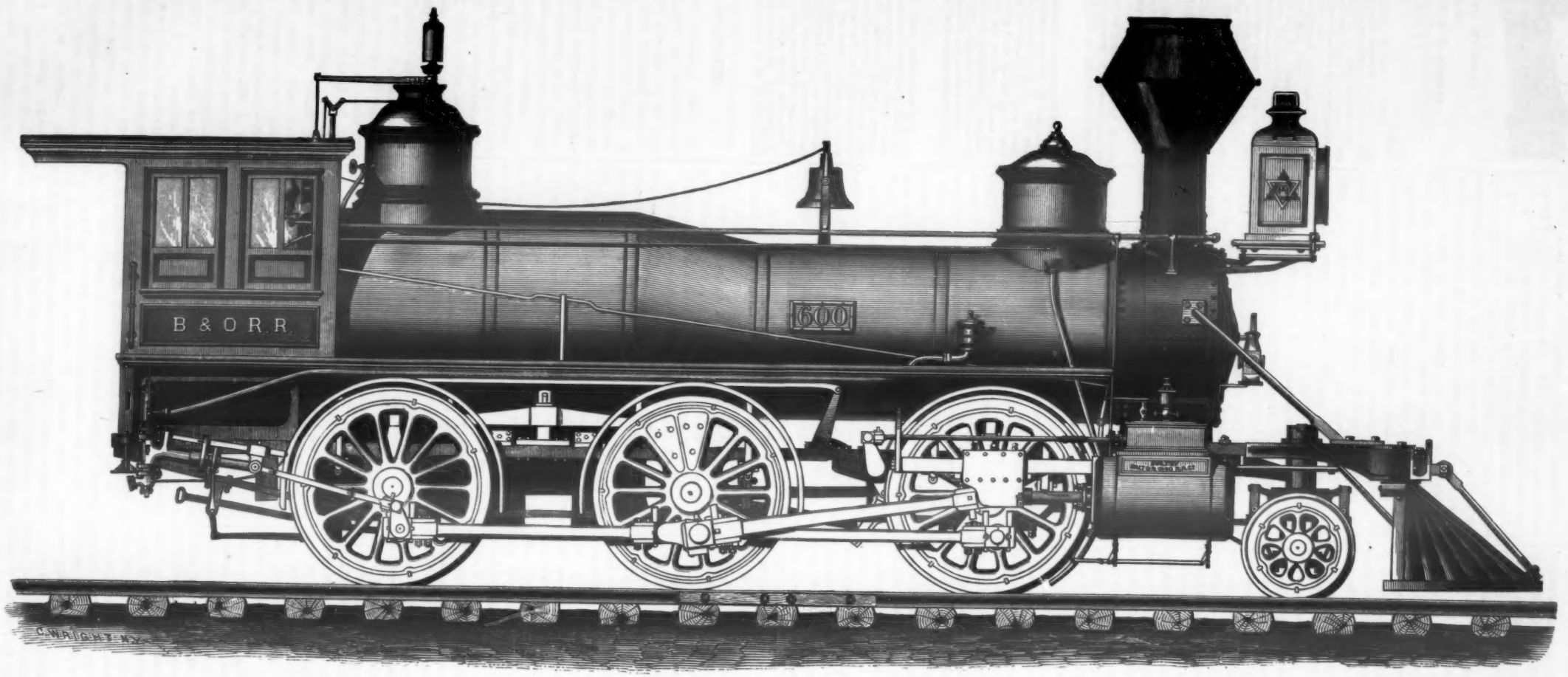
same
t you
diways
esult,"
r of
great
which
isive-
. It
over
Ex-
not
ed to
this
so,
dera-
sys-
n of
how-
well-
un-

imo
En-
ing
this
ere
rial
tor-
and

ols
and
rk-
ear-

ac-
ols?
ols
ed
ch
or
in-
os-
ic
ne
ch
e-
,"
t,
n-
h

r
n
f
-
r
s



MOGUL PASSENGER LOCOMOTIVE.

Built at the shops of the Baltimore & Ohio Railroad, and exhibited at the United States International Exhibition. Designed by John C. Davis, Master of Machinery.

this success is the result of the competition of the ablest persons engaged in the occupation. Every piece of work is tested by actual use. The locomotive must draw a specific load up a given grade; a coffer dam must resist the pressure of water in which it is placed; and the sewer must conduct away the drainage. A blunder means failure. Now in attempting to teach practical engineering in technical schools, the professors must assume that they, single-handed and without the stimulus of competition, or without having their theories subjected constantly to the test of practice, can eliminate out of their inner consciousness the best way of doing all kinds of engineering work, which, as we have seen, in actual practice results only from the exercise of all the faculties of all the ablest men in the profession.

Certainly there is need enough of education in all the fields of engineering in this country, but don't let us make the mistake of feeding young men on salt alone when they are in need of bread and meat.

The thing which now seems most necessary to be done is to open the avenues in which practical experience can be gained, and the selection of educated young men for such positions, as is now done to some extent on the Pennsylvania Railroad. Of course they must all be subjected to a process of the survival of the fittest, and doubtless a large proportion will be found to be inefficient; but sheep can easily be distinguished from goats when turned out to pasture. The mistake which, it is believed, the technical schools are in danger of making, is that of undertaking to teach the practice of engineering, instead of confining their instructions to its theory alone.

CENTENNIAL TRAVEL.

American railroads seem less liable to great fluctuations in passenger traffic than the European roads. A fair or excursion or some great public meeting occasionally puts a line to a test, but in most cases the influx of travel can be foreseen and receive special provision, while usually it lasts but a few days at most, and so does not complicate traffic long. "The excursion season," which enormously increases travel in England and on some parts of the Continent for many weeks every year has its counterpart here, but only a faint one, taking the country as a whole. But this year travel was sensibly stimulated for the first four months of the great exhibition, while for the last two—the months of September and October—it acquired proportions wholly without example on this side of the Atlantic. Probably every railroad in the country has felt this increase of travel, while those within three or four hundred miles of Philadelphia have had such an accession of passengers as greatly to modify their business and compel the working of their lines with special reference to passenger traffic.

The effect of a pressure of passenger traffic in Great Britain—or one of its effects seems to be ordinarily not only complication, but confusion, great irregularity and a great increase in the number and fatality of accidents. We hear of collisions by which thirty or forty persons are killed at once, and some English journals have named the season of active travel the "accident season."

Yet English railroads are in very many respects better provided than ours to accommodate great accessions of traffic. Most of those which have any considerable traffic have double tracks throughout; the road-beds are superior to those of all but the best of our lines; the utmost care is taken to prevent obstructions of the track, by avoiding grade crossings and preventing the presence of men or cattle on the tracks; moreover the tracks are guarded to an extent never attempted here. The passenger is not only forbidden to go wrong, but he is helped to go right much more than in this country; the force at stations being very much more numerous on English than on American railroads. And from the evils likely to attend a crowded traffic those best of antidotes yet devised, the block system and interlocking switches and signals, are very widely applied in England. Here most of our roads, including many with a heavy mixed traffic, have single tracks; a great many have inferior tracks; the force with which they are worked is very much smaller than in any other country; the block system and interlocking switches and signals are employed only on a small part of two or three roads.

Again, British railroads have for years been accustomed to great fluctuations in passenger traffic, and to such accessions in certain seasons as try the capacity of tracks and motive power. They have had experience with the difficulties and complexities arising therefrom, and have, we may presume, made special provision for them, and modified their systems of working to suit these special circumstances, which with them had become the rule at certain seasons yearly.

American railroads, on the contrary, had never had such an experience before. The pressure of traffic could be foreseen, but the complexities which it would cause had to be estimated, for examples were lacking. Freight trains had blockaded our railroads sometimes, but passenger trains rarely or never, unless during the war, when trains with troops were often run much the same as freight trains. They had, as it were, a new problem to solve.

Moreover, this pressure of traffic came just at the season when freight traffic is most active. On a very large number of American railroads, including several of those which have the heaviest passenger traffic, the freight business is heaviest in September and October—just the months when the Centennial passenger traffic reached its maximum.

This traffic came also after three years of serious business depression which had been especially severe on railroad companies. On many lines which had been accustomed to a considerable increase of business yearly traffic had ceased to grow or had grown smaller, and the owners consequently had ceased to provide for a growing traffic; profits had decreased largely almost universally, and economy in all expenditures had become a general necessity. In some cases, no doubt, the economy in maintenance had been pushed so far as to leave roads and rolling stock materially depreciated. The result of the summer's business, however, makes it improbable that these cases were numerous. However, in most cases there had been no considerable additions to rolling stock for three years; in some cases there was even a decrease. Thus the great access of traffic fell upon roads which for the most part had made no special additions to their facilities for accommodating it, had not even made such additions as were customary previous to 1874.

Thus the Centennial traffic was calculated to test our railroads severely, their track and rolling stock and working appliances, their systems of working, their organization and the staff of men who work them. On the lines diverging from Philadelphia the traffic, that is, the exceptional traffic added to the ordinary traffic, has probably been greater than was ever known before. We have not the figures for comparison; but as the average attendance in September and Octsber was greater than at any previous exhibition, it is probable that the passengers arriving by railroad were also more numerous; and, as Philadelphia has fewer rather than more lines than London and Paris, that its leading lines were more crowded with excursion traffic than any London or Paris roads ever have been.

They have stood the test, it seems to us, with great credit to themselves. The attendance at the Exhibition, and consequently the Centennial travel, was so light during the first three months that many believed that there would be but little addition to the ordinary traffic after all. Thus when in the latter part of August passengers came in armies requiring transportation, many managers were surprised, if not caught unprepared. Thence till the close of the Exhibition most important lines were crowded to the utmost; every car which could serve to carry passengers was pressed into the service; trains were lengthened so as to require two, three and occasionally four engines. The great number of excursions and the extraordinary attendance on "State days" at the Exhibition made this great traffic quite irregular on the lines nearest Philadelphia: while always crowded, sometimes they had nearly twice the average large traffic. Yet the work has, on the whole, been done very satisfactorily. No doubt the crowding has often caused considerable inconvenience to passengers, and trains have been behind time to an extent hardly ever known before in this country; but the railroads seem to have succeeded in carrying all who offered themselves, and in carrying them with reasonable promptness, and, what is especially remarkable, with fully the usual degree of safety.

It is of this latter that we desire particularly to speak. While abroad an increase of traffic seems to bring with it a much greater liability to accident, here the number of accidents and the fatalities caused by them seem to be not at all in proportion even to the larger traffic.

According to our "Record of Train Accidents" for the last five years, the numbers of accidents and of persons killed and injured thereby during the months of September and October, for the past five years, have been:

	No. of Accidents.	Killed.	Injured.
1872	161	53	206
1873	194	40	122
1874	170	43	165
1875	204	62	256
1876	209	81	248

Here we see that the number of accidents this year is but a trifle greater than last, indicating that the complexities due to the unparalleled amount of travel had very little effect on the number of accidents to trains. The number killed by these accidents was much greater this year, as was to be supposed, the danger of killing a passenger being nearly twice as great with a train of 400 passengers as with one of 200; but we find that the number injured and not killed is even less than last year. Moreover, the addition to the number of killed this year is largely accounted for by the number of "tramps" killed by freight-train accidents while stealing rides—a thing hardly known heretofore, but now adding very largely to our list of deaths by train accidents.

An examination of the list of accidents will lead to the conclusion that few of them were really excusable; that is, if all the railroad officers and employes had exercised due care, most of these accidents might have been avoided. But if we compare the results with those likely to have occurred abroad under a similar pressure of traffic, we believe the American railroads deserve great praise, and that one of the most creditable things connected with the great Exhibition was the transportation of passengers to and from it by the railroads—the manner in which the railroads provided for the wholly exceptional requirements, so much greater than had ever been made upon them before; and it indicates that whatever failings there may be in our system and railroad men, we have unusual skill in the handling of traffic, unusual readiness of resource in meeting exceptional circumstances, and, we may add, unusually successful appliances for mitigating the effects of the numerous accidents which we do not prevent.

Nos. 6 and 600.

Among the interesting exhibits at the Centennial were two locomotives, one No. 6 and the other No. 600, exhibited by the Baltimore & Ohio Railroad Company. No. 6 was one of the old "grasshopper" engines, of which we published a full description and illustrations in the *Railroad Gazette* of March 8, 1873, to which we refer our readers. As the exhibition of this engine at the Centennial has attracted fresh attention to it, we republish the engraving of it, with the original inscription which is on the lithograph of the engine published by the manufacturers. Unfortunately the scale of the two engravings is not the same, so that they do not give an idea of the relative size of the two engines, the old engine being drawn to a scale of $\frac{3}{8}$ in. = 1 foot, and the other 5.16 in. = 1 foot, so that the old engine appears larger in proportion to the new one than it really is.

The following are the dimensions of the new engine, No. 600:

CYLINDERS.	
Diameter	1 ft. 7 in.
Stroke of piston	2 ft. 2 in.
Length of steam ports	1 ft. 3½ in.
Width " "	1¼ in.
" " exhaust	2¾ in.
Maximum travel of valve	5 in.
Outside lap of valves	1 in.
(Inside line and line.)	
Diameter of exhaust nozzle (single)	4¼ in.
WHEELS.	
Diameter of driving wheels	5 ft.
Distance between centres of front and rear driver	15 ft. 1 in.
Total wheel base of engine	22 ft. 11 in
" " " " " and tender	50 ft.
Driving axle journals, diameter	6¾ in.
" " " length	8 in.
Diameter of main crank pin	4½ in.
Length " " " "	5 in.
Diameter of truck wheels	2 ft. 7 in.
BOILER.	
Outside diameter of smallest ring	4 ft. 2 in.
Thickness of boiler plate (iron)	⅜ in.
Number of tubes	165
Length of tubes	11 ft. 10½ in.
Outside diameter of tubes	2¼ in.
Length of fire-box inside	8 ft. 3 7-16 in.
Width " " "	2 ft. 10⅝ in.
Depth " " (sloping)	43 7-16 in.—62 7-16 in.
Thickness of flue sheet (steel)	½ in.
" " sides and back sheets (steel)	5-16 in.
" " crown sheet (steel)	⅜ in.
Square feet of grate surface	23.7
" " " heating surface in fire-box	122
" " " " " tubes	1,150
Total square feet of heating surface	1,272
WEIGHT.	
Weight of engine in working order	90,400 lbs.
" on drivers	76,550
" of tender, empty	51,100
" " loaded	60,400
Capacity of tender, coal	120 bushels.
" " " water	3,000 gals.

SERVICE IN WHICH ENGINES ARE EMPLOYED.

These engines are employed in running the through passenger trains (mail and express) on Third Division, Baltimore & Ohio Railroad, extending from Keyser to Grafton, 78¾ miles. The grades on this division are as follows: Keyser to Piedmont, five miles level; Piedmont to Altamont, 17 miles continuous grade ascending west 116 ft. per mile: portions of this grade are 125 feet per mile, and there are curves of 600 ft. radius; Altamont to Cranberry, 19 miles, road undulating, grades from 30 to 80 ft. per mile; Cranberry to Rowlesburg, 11 miles (Cranberry grade) descending west 116 ft. per mile; Rowlesburg to Tunnelton (Cheat River grade), ascending west, 7⅛ miles, 110 ft. per mile; Tunnelton to Newburg (Newburg grade), 6¼ miles, descending west 100 feet per mile; Newburg to Grafton, 12¾ miles, average grade descending west 35 feet per mile.

Average through trains, say—	
1 baggage car, 12 wheel	44,800 lbs.
1 postal car, 12 wheel	45,950 "
2 passenger cars, 12 wheel (60 seats) each 42,400	84,800 "
1 Pullman car, 12 wheel	59,450 " "
	235,000 lbs.
Schedule time over division	3h. 00m.
Schedule time up 17-mile grade, 5-car train (single)	1h. 05m.
6-car train (with helper)	0h. 50m.

Foreign Railroad Notes.

The German railroads have already begun to prepare for an effective representation of themselves, and of all German railroad manufactures as well, at the Paris exhibition, eighteen months hence. A committee of the German Railroad Union has been holding sessions to discuss the subject, and has recommended that the railroads should co-operate with German exhibitors of railroad manufactures, not only by granting free transportation to the exhibition, but by half rates on return shipments, and, more than all, by ordering from the manufacturers various objects on condition that they be exhibited. The committee further recommends that the railroads make directly a collective exhibit illustrative of the historical development and the present condition of railroad transportation in Germany. Very suggestively it is said that "if some other great railroad systems are

induced by this example to make a similar exhibit, then there will be brought together material very important for a comparative study of railroad transportation, which can be collected in no other way."

A correspondent of a Swiss paper proposes a basis of a uniform tariff system. He would have all railroads charge precisely the same per ton per mile, and to make up the difference in working expenses, interest on cost of road etc., would establish a conventional mileage, to be called the "rate mileage," which would be published in all time-tables and other statements of lengths of road, and would serve as the basis of all calculations of freight rates. Already in Switzerland (as in many other continental countries) there is a separate terminal charge, intended to cover the expense of loading and unloading, etc., and this writer purposes that a separate charge should be made for insurance, in accordance with the shippers' declaration of the value of the goods. Then any shipper with a table of conventional mileages and the standard uniform transportation rate and insurance premium could calculate for himself the cost of any shipment between any two stations. But he goes too far in his plan for simplification when he would abolish all classifications of freight and charge according to the space occupied in the car, be the goods valuable or cheap, and under all circumstances. He supposes that he has overcome all the reasonable objections to this system (known in Germany as the "Alsace-Lorraine system," as it is in use on the Imperial railroads in these provinces); but it is often necessary to carry high-priced goods at lower prices or else lose the freight entirely, and any system which like this would absolutely prevent shipments of goods which will not move except at rates less profitable than the average is economically vicious and an injury to the community and the carriers alike.

The little French watering-place railroad from Bayonne to Biarritz, for which the Mallet compound locomotives have been built, has also a stock of novel cars designed by a Mr. Carimantrand. They are two-story cars, the frames wholly of iron, but the body of very thin sheets of wood (about 5-16 in. thick), covered on both sides with canvas glued on. The upper story is covered like the lower, and is approached from the inside of the lower story by a convenient staircase. Each car has compartments for three classes of passengers and for baggage, and two terraces for smokers. The windows are very large, for the sake of the view. There are seats for 92 passengers, which is more even than are carried on the admirable open cars that run on the Prospect Park & Coney Island Railroad (these seat 80). The cars are said to be very light, but with the usual perversity on this head, the actual weight is not given. The designer believes that they afford great advantages for suburban and local roads.

A writer discussing in *Die Eisenbahn* the relative merits of outside and inside locomotive furnaces says that on a certain English railroad express locomotives are used with inside cylinders and inside furnaces, having under the smoke-box an axle carrying 23,500 lbs. and making, when under full speed, more than 400 revolutions per minute. Still, though the ballast of this road is very sandy, the journals of this axle have not been subject to heating to such a degree as to make a change in the construction desirable. The truck wheels of American locomotives must sometimes make 700 revolutions per minute; but they do not often have any such enormous weight thrown away on them—enough for driving-wheels.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Cincinnati Southern.—The track from South Danville, Ky., southward is extended 15 miles, to Fishing Creek.

Omaha & Republican Valley.—The first track is laid from Valley Station, Neb., southward 3 miles.

This is a total of 18 miles of new railroad, making 1,931 miles completed in the United States in 1876, against 1,128 miles reported for the corresponding period in 1875, 1,594 in 1874, 3,228 in 1873, and 5,982 in 1872.

The Grain Movement for Twenty-eight Weeks.

The shipments of grain of all kinds from the eight principal Northwestern markets for each week since April 22 have been, in bushels, by lake and by rail:

Week ending—	By lake.	By rail.	Total.	Per ct. by rail.
April 29	1,634,541	2,072,946	3,707,487	56
May 8	2,445,191	2,292,633	4,737,824	48½
" 13	1,538,526	2,302,940	3,841,466	60
" 20	1,602,170	2,016,304	3,618,474	55¾
" 27	1,747,408	1,820,456	3,567,864	51
June 3	2,412,162	1,797,922	4,210,084	42¾
" 10	2,894,915	2,147,670	5,042,585	42½
" 17	2,921,405	2,391,811	5,313,216	45
" 24	2,728,706	2,198,054	4,926,760	44¾
July 1	1,821,155	1,784,548	3,605,703	49½
" 8	1,765,010	1,205,184	2,970,194	40¾
" 15	1,648,508	1,228,678	2,877,186	42¾
" 22	2,269,336	1,032,825	3,302,161	31¼
" 29	1,466,502	1,038,208	2,504,710	41¾
Aug. 5	2,055,243	1,283,268	3,338,511	38¾
" 12	1,744,059	1,300,720	3,044,779	42¾
" 19	2,150,292	1,614,256	3,764,548	42¾
" 26	2,352,152	1,520,311	3,872,963	39¼
Sept. 2	1,698,491	1,573,058	3,271,549	48¼
" 9	2,374,473	1,818,411	4,192,884	43¼
" 16	2,963,634	1,688,318	4,651,952	36¼
" 23	2,268,894	1,820,361	4,089,255	44½
" 30	2,427,357	1,797,847	4,225,204	42½
Oct. 7	3,009,394	1,650,858	4,660,252	35½
" 14	2,530,720	1,835,991	4,366,720	42
" 21	2,673,647	1,800,837	4,474,484	40¼
" 28	2,635,237	1,359,160	3,994,397	34
Nov. 4	1,550,948	2,351,914	3,902,862	60¼
Total for 28 weeks	61,330,085	48,745,989	110,076,074	44¼

Though, compared with the previous week, the last week shows some falling off in total shipments, the rail shipments have increased enormously, and are larger than for any other week of the 28 save one—that ending June 17; and were a larger proportion of the total shipments than for any previous week without exception. The greater risks of lake shipments so late in the season discourage such shipments, and it will now be but a short time before they will cease entirely. Moreover, in anticipation of higher rail rates, shippers are likely at this season to hasten forward their grain, which will account for the enormous rail movement and the reported blockade of freight in the Northwestern grain centres.

For the same 28 weeks the receipts at the different Atlantic ports have been:

	Corn.	Per cent. of total.	All grains.	Per cent. of total.
New York	19,624,732	35.1	49,350,928	46.2
Boston	5,795,698	10.3	8,348,778	7.8
Portland	495,400	0.9	875,270	0.8
Montreal	3,379,179	6.0	11,089,708	10.4
Philadelphia	12,814,325	22.9	19,308,275	18.1
Baltimore	11,961,100	21.5	15,126,285	14.2
New Orleans	1,828,824	3.3	2,645,817	2.5
Total	55,899,258	100.0	106,745,061	100.0

Compared with the previous week New York falls back a little in rank as a corn receiver, and just maintains its position in all grains. Philadelphia loses a point in both; Baltimore gains in corn and holds its own in all grains; and New Orleans gains a point in all grains.

Of the total corn receipts for the last week reported, the percentage arriving at each port was: New York, 33 per cent.; Baltimore, 25; Philadelphia, 19; Boston, 12¼; Montreal, 5½. Of the total grain receipts these percentages were: New York, 48⅔; Philadelphia, 15¼; Baltimore, 14¼; Boston, 9¾; Montreal, 8¼; New Orleans, 3⅔.

The total receipts were a twelfth lighter than for the previous week; and New York receipts were a quarter less.

"THE WINTER PORT OF CANADA" is what the Halifax people are now eager to make their city, hoping through the new Intercolonial Railway to transfer to their own city the business from the upper provinces which now goes to Portland in the winter. An effort is being made to induce the Government to require the steamship lines which are subsidized by the Dominion, and which run to Montreal when the St. Lawrence is open, to run to Halifax in the Winter, or at any rate to stop there to land the mails. As to the mails, it is urged that the sea voyage will be much shortened; the mails from England to the Maritime Provinces will be delivered at least a day sooner, and there will also be a considerable saving in time to Quebec and the upper provinces; the mails will be always under the control of the Dominion post office and will not have to pass through foreign territory, and the Government will profit by carrying them over its own road, instead of paying the Grand Trunk for the service. It is thought that if the mails have to come to Halifax much other traffic will follow them, and the port will benefit accordingly.

OCTOBER EARNINGS, so far, have been reported by twenty railroad companies, eight of which show a decrease when compared with last year's October earnings. The decreases nearly balance the increases, some of them being very large, and being on the larger roads in the list. Comparatively few of the great roads report, however, and it is not possible to draw general conclusions from those that do.

MR. WELLINGTON'S PAPER is again delayed for the sake of obtaining important information which has been promised the author, who expects to be able to complete an instalment in time for next week's paper.

Report of Car Service and Expenses.

Mr. William Mahl, Auditor of the Louisville, Cincinnati & Lexington Railroad, and one of the first to give attention to the subject of car-mileage and expenses, makes his reports in the following form, which is the actual report for September last:

Car Service and Expenses per car mile.

Class of Cars.	Mileage.	Repairs per mile in cents.
Passenger	76,117	2.144
Baggage and mail	14,306	3.387
Express	1,716	.020
Freight	290,804	.683
Road	60,376	.022
Foreign freight	144,854	..
Parlor and sleeping	25,492	4.539

Other Train Expenses.	Passenger trains.	Freight trains
Cleaning, oil and inspecting	.224 cts.	.044
Oil and waste for boxes	.030 "	.021
Fuel and lights	.. ..	..
Links and pins	.. ..	.022
Other train supplies	.009 "	.031
Galls. of oil per 1,000 miles	1.296 "	.906
Lbs. of waste " "	.112 "	.489

Cost of passenger, baggage, mail and express cars repairs and expenses per car mile	.2.506 cents.
Cost of freight car repairs and expenses per L., C. & L. freight car mile	0.875 "

Per Total L., C. & L. car mile.

Superintendence and clerks	0 047 "
All other maintenance of Car Department expenses	0.022 "
Percentage of foreign freight car mileage to L., C. & L. Freight car mileage	33.23 per ct.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Utica & Black River.—At the annual meeting in Utica, N. Y., Nov. 8, the following directors were chosen: DeWitt C. West, John Thorn, Robert Lenox Kennedy, James Sayre, Theodore S. Faxton, Isaac Maynard, Edmund A. Graham, William J. Bacon, Russell Wheeler, Lewis Lawrence, Abijah J. Williams, Daniel B. Goodwin, Abram G. Brower. The board elected officers as follows: President, DeWitt C. West; Vice-President, John Thorn; Treasurer, Isaac Maynard; Secretary, W. E. Hopkins; Executive Committee, John Thorn, E. A. Graham, Isaac Maynard, A. J. Williams, Russell Wheeler.

Poughkeepsie Bridge.—Mr. A. B. Stone, of New York, has been chosen President of this company, in place of John F. Winslow, resigned. Mr. Stone is also President of the American Bridge Company, contractor for the construction of the bridge, and of several iron companies.

Pennsylvania Transportation Company.—The Court of Common Pleas at Meadville, Pa., has appointed B. D. Fletcher, of Titusville, Pa., Receiver.

Indianapolis, Cincinnati & Lafayette.—At the annual meeting in Indianapolis, Nov. 6, the following directors were chosen: Moses Fowler, Wm. F. Reynolds, Lafayette, Ind.; Thomas A. Morris, Indianapolis, Ind.; M. E. Ingalls, Theodore Cook, Cincinnati; Wm. A. Booth, George Bliss, C. G. Landon, New York; Thomas H. Perkins, Boston. The board re-elected M. E. Ingalls, President; Charles H. Booth, Secretary; E. F. Osborn, Treasurer. The new directors are Thomas A. Morris and Theodore Cook, who replace Jos. S. Fay, there being one more director than last year.

Ohio & Mississippi.—Mr. C. B. Cole, late Superintendent of the Louisville Branch, has been appointed Superintendent of the Eastern Division, in place of J. E. Gimperling, resigned.

New York & Philadelphia New Line.—Mr. Francis H. Saylor has been appointed General Manager of the New York & Philadelphia New Line. The rules and regulations of the several roads constituting the line will continue in force on each portion, and all employes will respect them as heretofore. Mr. Saylor was Chief Engineer of the Delaware & Bound Brook road.

Commission on Improvement of South Pass of the Mississippi.—The President has appointed Col. G. Barnard, Lieut.-Col. H. G. Wright and Lieut.-Col. B. S. Alexander, of the Corps of Engineers, a commission who were to meet in New York, Nov. 6, or as soon as practicable thereafter, "to report, for the information of the Secretary of War, an opinion upon certain subjects connected with the improvement of the South Pass of the Mississippi River."

American Society of Civil Engineers.—The additions to the Society noted in the October number of its *Journal* are: Augustus P. Barnard, Assistant United States Civil Engineer, No. 28 West Twentieth street, New York; Daniel P. Bruner (Junior), Assistant Engineer Pennsylvania Railroad, Harrisburg, Pa.; George W. Dresser, No 42 Pine street, New York; Edwin F. Glaskin (Junior), No. 73 Amherst road, Hackney, London, England; Frederick T. Hampton, Chattanooga, Tenn.; James C. Kennedy (Junior), Assistant Engineer Toronto Water Works, Toronto, Canada; Frank W. Whitlock (Junior), Assistant Engineer Boston Water Works, South Framingham, Mass.

Charlotte Harbor & Northern Central.—At the last annual meeting of this Florida company, held Oct. 20, the following directors were chosen: George H. Backwood, N. S. Blount, N. R. Gruelle, H. C. Howard, James Hunter, S. P. Ivey, Thomas C. Lanier, B. F. Matthias, George B. Phinney. The board elected B. F. Matthias, President; George H. Backwood, Vice-President, N. R. Gruelle, Secretary; H. C. Howard, Treasurer.

Boston, Winthrop & Point Shirley.—At the annual meeting in Boston recently the following directors were chosen: Wm. G. Barker, John L. Butman, Frank H. Hills, Samuel G. Irwin, George McQuestion, C. A. Parks, H. B. Tewksbury. The board elected S. G. Irwin, President; C. A. Parks, Vice-President; E. G. Allen, Clerk; F. H. Hills, Treasurer: J. L. Butman, Superintendent.

Missouri Pacific.—A circular from Mr. C. W. Mead, General Superintendent, announces the following changes:

Thos. L. Harkness has been appointed Cashier of this company. All business pertaining to that department will be addressed to him at St. Louis.

Geo. H. Heafford has been appointed General Passenger Agent of this company. All business pertaining to that department will be addressed to him at St. Louis.

On and after Monday, Nov. 6, the following changes will be made in the operating of the road:

The division from St. Louis to Chamois, including the Carondelet branch, will be in charge of C. H. Chappell, Assistant General Superintendent, with headquarters at St. Louis.

The division from Chamois to Atchison, including the Boonville and Lexington branches, will be in charge of W. Cumming, Division Superintendent, with headquarters at Sedalia.

The appointments of Messrs. Chappell and Harkness are new. Mr. Cumming is transferred from the Eastern to the Western Division. Mr. Chappell was formerly connected with the Chicago, Burlington & Quincy and more lately with the Missouri, Kansas & Texas. This staff includes several men of exceptional ability.

Chicago, Cincinnati & Louisville.—At the annual meeting, Nov. 8, the following directors were chosen: H. H. Walker, J. W. Helmer, Wm. Cutting, V. T. Malott, David Macy. The road is controlled by the Indianapolis, Peru & Chicago.

Eastern Counties.—Mr. Charles C. Gregory is appointed Chief Engineer and W. D. Barclay Assistant Engineer. Their headquarters for the present are at New Glasgow, Nova Scotia.

Montclair & Greenwood Lake.—Mr. A. J. Waldron has been appointed Master Mechanic. He has been for several years in charge of the Toledo, Peoria & Warsaw shops at Warsaw, Ill.

Central of New Jersey.—Mr. W. W. Stearns has been appointed Assistant General Superintendent in charge of the Central Railroad proper and its branches in New Jersey, and Mr. W. S. Polhemus Assistant General Superintendent in charge of the Lehigh & Susquehanna Division and branches.

Chicago & Northwestern.—Mr. E. J. Cuyler, Superintendent of the Galena Division, has been transferred to the Wisconsin and Milwaukee divisions, in place of Mr. A. A. Hobart, who has gone to the Chicago, Burlington & Quincy as Assistant General Superintendent.

PERSONAL.

—Mr. Phinehas Barnes, who for several years has been an assistant of Mr. A. L. Holley engaged chiefly in the erection of Bessemer steel works (and a frequent contributor to the *Railroad Gazette*), will deliver a lecture Dec. 2 on "the Modern Locomotive," being one of the "Cooper Union Saturday Night Lectures" to be given in the great hall of the Cooper Union, New York. Mr. Barnes was formerly engaged in a locomotive works, and has collected considerable material recently to illustrate late developments in locomotive practice. His lecture will be illustrated by stereopticon views. Tickets can be had gratis at Van Nostrand's book store (No. 23 Murray street), and at the office of the Cooper Union.

—Mr. George Howard has resigned his position as Superintendent of the Western Division of the Ohio and Mississippi road.

—Mr. Aaron Steinbach, Master Car Builder of the Philadelphia & Reading Railroad, died at his residence in Reading, Pa., Nov. 7. He had been in the employ of the company over 30 years and was a faithful, competent and valued officer. Mr. Steinbach was a prominent member of the Master Car Builders' Association and its Treasurer for several years past.

—Mr. J. E. Gimperling has resigned his position as Superintendent of the Eastern Division of the Ohio & Mississippi Railroad. It is reported that his resignation is the result of differences with General Superintendent Waldron.

—Mr. E. J. Peck, at one time President of the Terre Haute & Indianapolis Company, died at his residence in Indianapolis Nov. 5.

—The statement of the resignation of Mr. Hickson as General Manager of the Grand Trunk Railway, which has been widely published, is denied in a telegram from Montreal.

—Gen. Herman Haupt has resigned his position as Chief Engineer of the Pennsylvania Transportation Company.

—Mr. Henry Harley, President of the Pennsylvania Transportation Company, has been arrested on charges of issuing fraudulent certificates supposed to represent oil in tanks, which oil has really no existence.

—Capt. Samuel Adams, a director of the Springfield, Athol & Northeastern Company, died at New Salem, Mass., Oct. 31.

—Mr. G. A. Hobart, Receiver of the New Jersey Midland Railroad, has been elected to the New Jersey State Senate from Passaic County as a Republican. Mr. Hobart received nearly 500 more votes than the rest of the ticket.

—Mr. Ned E. Farrell, for several years and until recently Manager of the Costa Rica Railroad, has established himself at Fremont, Neb., as a real estate and loan agent.

—Mr. Edward Lee Plumb, the agent of the International Company in its negotiations with the Mexican Government, has returned to Mexico.

—Among the members elected to the Connecticut State Senate are Mr. W. D. Bishop, President of the New York, New Haven & Hartford Company; Mr. C. M. Pond, of Hartford, a director of the same company, and Mr. R. M. Bassett, of Derby, a director of the Utah Northern and a large railroad contractor.

TRAFFIC AND EARNINGS.

Railroad Earnings.

The following are from reports made to the Massachusetts Railroad Commission for the year ending Sept. 30:

	Earnings.	Expenses.	Net earn.	Earn. pr mile.	P.c. of exps.
Boston & Maine	$2,370,619	$1,523,966	$846,653	$11,724	64.30
Boston, Revere Beach & Lynn	119,990	73,204	46,786	14,999	61.00
Connecticut River	600,050	382,269	217,781	10,744	63.71
Martha's Vineyard	8,259	7,053	1,206	991	84.98
New London Northern	508,902	348,282	160,620	5,089	68.44
New York & New England	1,000,482	737,470	263,012	7,198	73.71
Old Colony	2,230,580	1,476,527	754,053	8,277	66.19
Providence & Worcester	899,104	668,123	230,981	13,452	74.31

Other earnings are reported as follows:

Ten months ending Oct. 31:	1876.	1875.	Inc. or Dec.		P. c.
Atchison, Topeka & Santa Fe	$2,043,473	$1,197,472	Inc..	$846,001	70.6
Burlington, Cedar Rapids & Northern	942,675	1,072,695	Dec..	130,020	12.1
Canada Southern	1,423,731	993,544	Inc..	430,187	43.3
Central Pacific	15,100,166	14,483,018	Inc..	917,148	6.5
Chicago & Alton	4,211,817	3,891,673	Inc..	320,144	8.2
Chi., Milwaukee & St. Paul	6,679,139	$6,580,621	Inc..	$98,518	1.5
Denver & Rio Gra'de, Main Line	328,944	294,037	Inc..	34,907	11.9
Illinois Central	5,967,601	6,350,030	Dec..	382,429	6.0
Indianapolis, B.oom. & Western	1,255,502	1,073,380	Inc..	182,122	17.0
International & Gr't Northern	1,019,087	986,977	Inc..	32,110	3.3
Louisville & Nashville	4,197,768	3,812,738	Inc..	385,030	10.1
Michigan Central	5,708,619	5,480,540	Inc..	228,079	4 2
Missouri, Kansas & Texas	2,595,925	2,308,653	Inc..	287,272	12.4
Ohio & Mississippi	3,051,777	2,763,277	Inc..	288,500	10.4
St. Louis, Alton & T. H., Belleville Line	395,554	460,344	Dec..	64,790	14.1
St. Louis, Iron Mountain & Southern	3,046,647	2,875,527	Inc..	171,120	6.0
St. Louis, Kansas City & Northern	2,591,998	2,147,539	Inc..	444,459	20.7
Toledo, Peoria & Warsaw	1,212,592	882,806	Inc..	329,786	37.4
Nine months ending Sept. 30:					
Atchison, Topeka & Santa Fe	$1,758,385	$988,995	Inc..	769,490	77.8
Expenses	862,737	443,594	Inc..	419,143	94.5
Net earnings	$895,648	$545,301	Inc..	$350,347	64.2
Per cent. of exp's.	49.04	44.86	Inc..	4.78	10.6
Chicago, Burlington & Quincy	$4,152,619	$4,234,764	Dec..	$82,145	1.9
Cleveland, Mt. Vernon & Delaware	280,801	315,626	Dec..	34,825	11.0
Expenses	221,718	1,242,865	Dec..	21,147	8.7
Net earnings	$59,083	$72,761	Dec..	$13.678	18.8
Per cent. of exp's.	79.21	76.95	Inc..	2.26	2.9
Houston & Texas Central	1,988,347	1,758,382	Inc..	229,945	13.1
Expenses	1,359,140	1,344,389	Inc..	14,751	1 1
Net earnings	$629,207	$413,993	Inc..	215,214	52.0
Per cent. of exps.	68 37	76.46	Dec..	8.09	10.6
Kansas Pacific	2,154,821	2,416,054	Dec..	261,233	10.8
Expenses	1,291,597	1,287,592	Inc..	3,805	0.3
Net earnings	$863,424	$1,128,462	Dec..	$265,038	23.5
Per cent. of exps..	59.93	53.29	Inc..	6.64	12.5
Mobile & Ohio	1,244,091	1,148,130	Inc..	95,961	8 4
Paducah & Memphis	150,172	137,214	Inc..	12,958	9.4
Expenses	108,237	98,212	Inc..	10,025	10.2
Net earnings	$41,935	$39,002	Inc..	$2,933	7.3
Per cent. of exps..	72.16	71.58	Inc..	0.58	0.8
St. Louis, Iron Mt. & Southern	2,606,047	2,486,923	Inc..	119,124	4.8
Expenses	1,432,793	1,444,521	Dec..	11,728	0.8
Net earnings	$1,173,254	$1,042,402	Inc..	$130,852	12.5
Per cent. of exp's.	55.11	58.08	Dec..	2.97	5.1
St. Louis & Southeastern	803,454	708,699	Inc..	94,755	13.4
Expenses	657,977	632,893	Inc..	25,084	4.0
Net earnings	$145,477	$75,806	Inc..	$69,671	91.9
Per cent. of exps.	82.24	89.31	Dec..	7.07	7.9
Eight months ending Aug. 31:					
International & Gt. Northern	$735,022	$742,122	Dec..	$17,100	2.3
Expenses	484,156	490,547	Dec..	6,391	1.3
Net earnings	$240,866	$251,575	Dec..	$10,709	4.3
Per cent. of exps.	66.78	66.10	Inc..	0.68	1.0
Month of August:					
Union Pacific	$1,363,176	$1,015,459	Inc..	$347,717	34.2
Expenses	437,018	452,221	Dec..	15,203	3.4
Net earnings	$926,158	$563,238	Inc..	$362,920	64.4
Per cent. of exps.	36.48	44.44	Dec..	7.96	17.9
Month of September:					
Atchison, Topeka & Santa Fe	$265,593	$147,552	Inc..	$118,041	80.0
Expenses	104,699	58,696	Inc..	46,003	78.4
Net earnings	$160,894	$88,856	Inc..	$72,038	81 0
Per cent. of exps.	39.42	39.78	Dec..	0.36	0.9
Chicago, Burlington & Quincy	$675,692	$680,335	Dec..	$4,643	0 7
Mobile & Ohio	175,073	149,821	Inc..	25,252	16.9
Union Pacific	1,305,986	1,155,944	Inc..	150,042	13.0
Expenses	531,216	485,392	Inc..	45,824	9.4
Net earnings	$774,770	$670,552	Inc..	$104,218	15.5
Per cent. of exps.	40.67	42.00	Dec..	1.33	3.2
Great Western, of Canada	389,000	359,000	Inc..	30,000	8.4
Expenses	270,000	277,000	Dec..	7,000	2.5
Net earnings	$119,000	$82,000	Inc..	$37,000	45.1
Per cent. of exps.	69.41	77.16	Dec..	7.75	10.4
Month of October:					
Atchison, Topeka & Santa Fe	$285,088	$208,577	Inc..	$76,511	36.7
Burlington, Cedar Rap. & Northern	111,441	136,125	Dec..	24,684	22.2
Canada Southern	156,986	149,552	Inc..	7,434	5.0
Central Pacific	1,957,0.0	1,615,973	Inc..	341,027	21.1
Chicago & Alton	526,406	489,019	Inc..	37,387	7.6
Chi., Milwaukee & St. Paul	817,569	974,262	Dec..	156,693	16.1
Columbus & Hocking Valley	96,155	99,352	Dec..	3,197	3.2
Den. & Rio Grande, Main Line	35,269	29,037	Inc..	$6,232	21.5
Den. & Rio Grande, Trinidad Ext	14,719	.....	.....	.....	...
Illinois Central	718,740	816,508	Dec..	97,768	12.0
Ind., Bloom. & Western	137,811	137,556	Inc..	255	0.2
International & Gt. Northern	160,639	155,865	Inc..	4,774	3.1
Louisville & Nashville	540,097	466,392	Inc..	73,705	15.8
Michigan Central	647,210	671,874	Dec..	24,664	3.7
Missouri, Kansas & Texas	335,275	305,144	Inc..	30,131	9.9
Ohio & Mississippi	341,678	345,805	Dec..	4,127	1.2
Phila. & Reading	1,400,000	1,722,954	Dec..	322,954	18.7
St. Louis, Alton & T. H., Belleville Line	50,764	57,351	Dec..	6,587	11.5
St. Louis, Iron Mt. & Southern	440,600	388,604	Inc..	51,996	13.4
St. Louis, Kan. City & Northern	328,508	263,240	Inc..	65,268	24.8
Toledo, Peoria & Warsaw	137,979	127,167	Inc..	10,812	8.5
First week in November:					
Atchison, Topeka & Santa Fe	$52,453	$48,243	Inc..	$4,210	8.8
Chicago & Alton	84,046	99,807	Dec..	15,761	15.6
Chi., Milwaukee & St. Paul	181,000	230,172	Dec..	49,172	21.4
Michigan Central	130,499	153,426	Dec..	22,9.7	14.9
Week ending Oct. 27:					
Great Western, of Canada	£18,041	£18,924	Dec..	£883	4.7
Week ending Oct. 28:					
Grand Trunk	£37,900	£46,500	Dec..	£8,600	18.5

Lake, Canal and Ocean Rates.

Lake rates have continued extraordinarily low for the season: quotations most of the time have been 3 cents per bushel for corn and 3¼ for wheat from Chicago to Buffalo. Canal rates remained about 7⅛ for wheat and 7 for corn from Buffalo to New York most of the week; but Monday were down about half a cent a bushel, and Tuesday quotations were 6⅛ for wheat and 6 for corn. Meanwhile lake and rail rates have been steady at 15 cents for wheat and 14 for corn from Chicago to New York. There is constant complaint of lack of cars, but the pressure of freight is contemporaneous with a decline in water rates.

Ocean rates for grain have been lower, but recovered somewhat at the beginning of this week. Quotations per bushel Tuesday were: for grain from New York by steam to Liverpool, 7½d.; to London, 7d.; by sail from Philadelphia to Dublin or Belfast, 8½d.; to Cork for orders, 9d.; to Hamburg, 9¼d.; from Baltimore to Cork for orders, 9d.; from San Francisco to the United Kingdom, about 14½d. (45s. per ton). At this rate, it costs rather less to send wheat to Liverpool from San Francisco than from Chicago or Milwaukee.

Grain Movement.

Receipts and shipments of grains of all kinds for the week ending Nov. 4 are reported as follows, in bushels:

	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts	4,308,847	4,251,118	Inc.. 57,729	1.4
" " shipments	3,902,862	4,659,686	Dec.. 756,824	16.2
Atlantic ports' receipts	3,680,805	3,124,670	Inc.. 556,135	17.8

Of the shipments from lake ports, 60¼ per cent. was by rail this year, against 24⅝ in 1875, and 12 per cent. in 1874.

Chicago receipts and shipments for the week ending Nov. 11 were:

			Inc. or Dec.	P. c.
Receipts	1,383,386	1,579,455	Dec..196,069	12.4
Shipments	1,873,846	1,804,231	Inc.. 69,615	3.9

Coal Movement.

Coal tonnages for the week ending Nov. 4 are reported as follows:

	1876.	1875.	Inc. or Dec.	P.c.
Anthracite	524,119	456,866	Inc.. 67,253	14.7
Semi-bituminous	76,229	64,480	Inc.. 11,749	18.2
Bituminous, Pennsylvania	46,020	44,288	Inc.. 1,732	3.9

Anthracite shows an increase for the first time in many weeks.

The actual tonnage passing over the Pennsylvania & New York Railroad for the ten months ending Oct. 28 was:

	Tons.
From Lehigh Valley R. R.	410,739
From Bloomsburg Div., Del., Lacka. & Western	236,698
From State Line & Sullivan R. R.	33,038
From Pleasant Valley Branch	21,780
Total anthracite coal	702,255
Bituminous coal	321,221
Total coal tonnage	1,023,476

The anthracite shows an increase of 39,383 tons, or 4.9 per cent., over the same period in 1875.

The coal delivered to the Main Line of the Baltimore & Ohio Railroad by the Pittsburgh Division at Cumberland for the ten months ending Oct. 28 was as follows:

	Tons.
Keystone Company	42,755
Elk Lick	26,656
Connellsville and Westmoreland gas coal	118,226
Total	187,637

The shipments of coal from the mines at Pictou, Nova Scotia, for the ten months ending Oct. 28 were 166,474 tons. For the nine months ending Sept. 30 the actual production and the amount sold from the mines of Nova Scotia and Cape Breton were as follows:

	Production.	Sales.
Cape Breton, tons	232,911	193,637
Cumberland County	66,517	58,202
Pictou County	228,508	196,020
Other counties	5,299	3,764
Totals	533,235	451,623

For the same period in 1875 the actual sales were 521,363 tons, showing a decrease this year of 69,740 tons, or 13.4 per cent. The decrease was chiefly in the shipments to Quebec and the United States.

Railroad Traffic.

During October 21,514 loaded cars were moved over the Indianapolis Division of the Pittsburgh, Cincinnati & St. Louis road. Of these 13,052 were moved east and 8,462 west, giving an average movement of 421 loaded cars per day east and 273 west.

The want of cars is just now a serious question with many western roads. Nearly all the local lines in Indiana and Illinois report that they are absolutely unable to move the freight offered, because they cannot get the cars to put it in. Most of the western lines centering in Indianapolis are now refusing to let their cars go east of that point because they cannot spare them and do not know when they will get them back. This, of course, makes a transfer necessary. It is charged that the eastern lines keep their cars at home and are not making any present effort to meet the western demand, preferring their local tc through business at present rates.

Philadelphia papers publish the following statement of the business of the Philadelphia & Reading Railroad for October:

	1876.	1875.	Inc. or Dec.	P. c.
Passengers carried	1,410,466	658,552	Inc..751,914	114.2
Merchandise, tons	205,624	266,186	Dec.. 60,562	22.7
Coal, tons	804,731	857,272	Dec.. 52,541	6.1

A very large proportion of the passengers this year were Centennial passengers carried for short distances only.

Provision Movement.

The period from Nov. 1 to March 1 is known as the "packing season." Recently, however, there has been a great increase in the number of hogs packed, especially at Chicago, in the other eight months, known as "summer packing." The number packed in this period is reported as 2,062,000 this year, against 1,262,343 in 1875 and 1,200,444 in 1874. Of the entire number 1,250,000, or 62⅛ per cent., were packed at Chicago, which also packed 58 per cent. last year. The receipts were somewhat greater this year. For the entire year ending with October the number of hogs packed in the Northwest was 6,880,000 (about).

THE SCRAP HEAP.

Railroad Manufactures.

The Youngstown (O.) Rolling Mill is running full double turn and employs 225 men.

The Union Pacific Railroad Company has decided to add a rolling mill for making bar iron to its rail mill at Laramie, Wyoming.

The Himrod furnaces, near Youngstown, O., are both in blast, one making Bessemer pig, the other forge iron.

We are informed that the statement made in our issue of Nov. 3 that the Lochiel Iron Works, at Harrisburg, Pa., had shut down is not correct. The works have been closed for a short time, the main object being to take account of stock, and they will be at work again very soon. The closing of a large establishment is not a pleasant thing to record, and we are very glad to be able to make this correction.

The Phœnix Steel Wire Broom & Brush Company, of Chicago, has patented and is manufacturing a locomotive track broom for keeping the track clear of light snow and other small obstructions.

The Pittsburgh *American Manufacturer* of Nov. 9 says: "The Edgar Thomson Steel Company ceased operations last Saturday, intending to let the works stand for some four or five weeks."

It is said that the Uhler Iron Works, at Easton, Pa., have been leased to a New York company and will be started up very soon.

The Missouri Car & Foundry Company, at East St. Louis, are building 100 freight cars for the International & Great Northern Railroad.

Mr. J. B. Safford has made contracts for the introduction and use of his standard draw-bar on the International & Great Northern Railroad, and it is now being fitted to 100 cars being built for that road at East St. Louis and to 80 flat and 30 box cars built in the company's shops at Palestine, Tex. The Houston & Texas Central is also putting Safford's draw-bar on 100 new cars and the Little Rock & Fort Smith has adopted it.

The Cleveland (O.) Iron Works are running full time on rails and merchant bar. The company's blast furnace is making 50 tons of pig iron per day.

The Buckeye Bridge & Car Works of Miller & Jamison, at Cleveland, O., are running full time with 60 men on bridge and boiler work.

The King Iron Bridge Works at Cleveland, O., recently secured a contract for an iron highway bridge over the Brazos River at Courtney, Texas.

Attempt at Train Wrecking.

Last week an attempt was made to wreck a train on the Rome, Watertown & Ogdensburg road by piling obstructions on the track, which was unsuccessful, the engine throwing them to one side. The following letter was found near the place stuck in one end of a split stick, the other end being thrust into the ballast:

"R., W. & O. R. R. This will be a leson to you to pay youre employees of the road more wages 90 cents per day and $1.00 is't enough we will have resonable pay for our labor or we will bust youre rode up yours truley. You are the wurst company that thare is and you hav a grate meny enemys along the rode, now if you dont pay better wages we will run evry train from the track take our advise.—Mesnes."

On Nov. 11 a similar attempt was made on the Utica & Black River road at Deer River, N. Y., of which the Utica *Herald* says: "Two short rails of iron and ties were stood upward in the trestle of the Black River bridge, over a swampy place seven feet deep. The locomotive pilot struck the iron and ties and bent them down without leaving the track. The attempt was similar to the one made on the Rome road last Thursday, and as at Rome, a note signed 'reformers' was found near the place, saying the attempt was made on account of the reduction in wages, saying they wanted reform. It is believed to be the work of thieves or tramps who hope to rob passengers in case of accident."

Test of a Railroad Bridge.

On Nov. 9 the new Bussey Bridge, built by Mr. E. H. Hewins, of Boston, for the Boston & Providence Railroad, was tested by Superintendent A. A. Folsom, Master Carpenter George Folsom and Master Mechanic George Richards. The bridge is an iron skew deck bridge, 104 ft. between end pins, 130 ft. length of track between abutments, and on a grade of 50 ft. to the mile. On the test the two heaviest locomotives on the road, weighing together 116 tons, were coupled together and run over the bridge. At a speed of from 15 to 20 miles an hour the deflection produced was 0.53 in. Other tests were made, all resulting satisfactorily.

A Station Indicator.

The Boston *Herald* says: "An invention which will meet a want long felt by the general traveling public has just been patented by Mr. Conrad Jenson, an enterprising young German of this city, in the form of an indicator for steam cars, by which the various stations to be stopped at can be placarded. Travelers by railroads frequently are at a loss to understand the names of places as called out by the brakemen on the cars. By the invention in question all this annoyance is obviated. This indicator consists of tablets, about 18 by 6 inches, bearing the names of the different stations the train may run to in its trip, each tablet arranged in the order of stopping. They are mounted on a sliding hinge made of thick wire, and fold up something like a book, and are held in place by a lever, which is the key of the whole arrangement. Connected with that part of the lever nearest the tablets are two flat pieces of metal, each over an inch in length, one an eighth of an inch inside the other, and both extending in the form of an angle instead of running perpendicular to one another. Directly above this with the lever is connected the cord, which runs through a tube the length of the car, and so

connected on the rear as to be worked from the platform if necessary. By pulling the cord after a train starts from a station the name of the next stopping place appears.

"The first public trial of the indicator has been made on the Fitchburg Railroad. It performed all that was claimed for it. The Fitchburg Railroad proposes to have indicators on all their cars, and already have fitted up one train with them. The company will have them operated either from the platform or in the car, by the brakeman, although the cord which connects with any one of them can be attached with those of others, and thus every indicator in a train, no matter of how many cars, can be worked by one man, at one time, in any part of the train."

Prices.

Pig iron in the East seems to be weaker. No. 1 foundry, which has been quoted at $22 per ton steadily for a considerable period, is said to be offered at $21, and even lower prices are said to have been accepted, though leading companies affirm that $22 is still their lowest figure. No. 2 has sold at $19. Rails are quoted at $36 to $40 per ton at the mills for iron and $50 to $54 for steel; old rails, $20.50 to $21 and scraps at $27 to $28. Philadelphia quotations for bar iron are 2.25 to 2.3 cents per pound.

There is a rumor that the makers of steel rails have entered tion a combination, or are purposing to do so, to restrict produc into and limit competition, in the hope of increasing prices. The steel works generally have been well employed and their capacity much increased since the panic; but prices have gone down constantly, and an overproduction is possible with the present capacity of works.

Some Experiences with Thick Fogs.

It is the truthful reporter of the Chicago *Tribune* who tells this. The scene is in an office of the Chicago, Burlington & Quincy Railroad.

"The last meeting of the Lying Club was held in the second story of the Sixteenth street depot, and the greatest care was taken to prevent the people from knowing about it. In the mysterious manner common to newspaper men, a *Tribune* reporter learned of the meeting, and at once proceeded to the spot.

"He found Mike at the head of the stairs with a big club in one hand, a scrubbing brush in the other, and a pail of water where he could kick it over handily and deluge any one coming up stairs. Not wishing to hurt the old man's feelings, the reporter flanked him, and finding a ladder in the alley, climbed up to the window and through a broken pane of glass, imperfectly mended by inserting a *Times* supplement and an old pair of suspenders, he gazed on the festive scene before him. Being a little late, he missed the opening ceremonies, which are said to be very interesting. He was in time, however, to see Watkins borrow a plug of tobacco from Calkins, and after taking a bite, put the remainder in his pocket. 'Uncle Henry' was telling a fog story:

"'Was running from Aurora east one night and fog come up. Couldn't see nothing, so I had to smell my way. Had left Riverside and was wondering why I did not get to the crossing, when I smelt the cussedest stink you ever thought of. That seemed strange, so I called for brakes and stopped. Somebody had left the 'Y' switch wrong, and I had gone to the stock-yards without knowing it, and was then most three miles from the main track.'

"'I remember that night well,' spoke up Watkins. 'I was runnin' from Galesburg west, and it was so durned foggy that when we got to Monmouth we had to telegraph to Galesburg for a snow-plow to run ahead of us an' split ther fog so we cud get through.'

"Battles took a fresh chew of tobacco, lit his pipe, and with a determination to be victor this time written on his face, said:

"'Well, boys, speaking of fogs reminds me of one time when I was running on the Grand Trunk from Port Sarnia east. Went out one night with fourteen coaches and two engines. Just as we left Sarnia it began to fog. Grew thicker every second. Just as it was at its thickest—it was so solid that when the fireman started out to oil the valves, he had to come back and borrow my knife and take the coal shovel to clear the running-board—just as it was at it thickest, it turned cold, and 'fore we knew it we were froze into a big chunk of fog—engine, cars and all—and it took most a week to thaw us out." And Battles sat down with a grin, saying to himself: 'Beat that, if you can, Patty.'

"Watkins scratched his nose, borrowing Battles' paper of fine-cut (forgetting to return it) and commenced:

"'I just thought of the first time I ever run a passenger train. 'Twas on the New York Central, 'fore the bridge was built at Albany. Was a little late, and I was pretty anxious ter make time if I cud. Pretty soon we struck bunk agin a big pile of fog. Well, we run about two hours, and I got scart and so called for brakes just as it began to clear off. When it cleared off where d'ye think we was? Sure's snakes is snakes, we were on top ot a durn mounting in the State of Massachusetts. We had jumped the track somewhere, and the fog was so durn thick that it kep' us up, and we run clear across the Hudson River an' landed onto the mounting, ten miles from any railroad.'

"'Wa kins, that's a d—d lie,' shouted Battles, as Watkins concluded his yarn. Ed. dodged just in time to see the same old monkey-wrench skip past his ear and lodge on the northeast corner of Uncle Henry's nose. Just as things assumed the appearance of a ward meeting the reporter looked down and discovered Mike, with blood in his eye and the fire-extinguisher on his back. Just as he reached the ladder he stumbled and fell, the extinguisher meanwhile pouring a stream of soda-water down the back of his neck. Not wishing to intrude, the the reporter made a graceful exit, and took the next car down town."

OLD AND NEW ROADS.

Chicago, Burlington & Quincy.

The trustees give notice that under the provisions of the contract of lease of the American Central Railroad to this company, the sum of $131,249.93 has become applicable to the purchase of bonds of the American Central Company at a price not exceeding par and accrued interest; to which may be added the further sum of $568,655.93, previously set aside for the same purpose under the contract. Holders of American Central bonds are invited to send proposals for the sale of their bonds to John N. Denison, Assistant Treasurer, Boston, until Nov. 29.

Lake Shore & Michigan Southern Railway Mutual Life Insurance Association.

The board of directors has ordered an assessment of $1 on each member for the general expenses of the association. The assessment is payable in 30 days from Nov. 1, and is the second one made for this purpose since the association was formed, in March, 1869.

Midland, of Canada.

This road is now operated under an agreement by which the bondholders funded their coupons until 1879, and the net earnings were to be applied to extending the road from Orillia to Midland and to paying off the floating debt. Now, however, Mr. T. C. Wallbridge, who is agent for the bondholders in Canada, brings serious charges against the management. He says that the agreement with the bondholders is not carried out in good faith; that the earnings are applied by the President at his discretion; that while rails have been laid on the extension from Orillia to Waubushene the work has been miserably done and the road is not safe for traffic; that nothing has been done for the extension beyond Waubushene; that the older part of the road is in a very poor condition; that the most necessary repairs have been neglected and there is no material on hand for repairs, and generally that the management of the road is wasteful and incompetent, and its business has been seriously injured. He also charges that the accounts have been falsified and that the wages of the employes have been allowed to remain unpaid and the floating debt increased largely, notwithstanding favorable reports of earnings made.

Gainesville, Ocala & Charlotte Harbor.

At a recent meeting of the stockholders in Philadelphia, it was resolved to change the name of the company to Charlotte Harbor & Northern Central, and to begin the work of locating the line from Charlotte Harbor, Fla., northward to the Georgia line.

Shenango & Allegheny.

A preliminary examination has been made for a proposed extension of this road from Hilliard, Pa., to Petrolia, in the Butler oil district. The distance is 8½ miles.

Truckee & Martin's Mill.

Arrangements are being made to build a railroad on the one-rail or prismoidal plan from Truckee, Nev., to Martin's Mill, a distance of 14 miles. It will be used to carry lumber. The intention is to extend it hereafter to Sierra Valley.

Plymouth, Kankakee & Pacific.

There is talk of reviving this project and of laying rails on the old road bed, most of which was graded several years ago.

Kingston & Pembroke.

Work is in progress on the extension of this road northward from the present terminus at Snarbot Lake, Ont. The trouble with Frontenac County has been settled and the county agrees to pay the company $110,000 in bonds dated July 1, 1876, in full of all claims for bonus.

Seattle & Walla Walla.

The work on the first section of this road out of Seattle, Wash. Ter., is progressing steadily. A locomotive has been received and the foundations laid for a repair shop in Seattle, where most of the cars for the road will be built.

Dividends.

Dividends have been declared by the following companies:

Nashua & Lowell, $2 per share, payable Nov. 13.

Boston & Providence, 4 per cent., semi-annual, payable Nov. 15.

Catawissa (leased to Philadelphia & Reading), 3½ per cent., semi-annual, on the preferred stock, payable Nov. 15.

Boston, Concord & Montreal, 3 per cent., semi-annual, on the preferred stock, payable Nov. 20.

Cincinnati Southern.

The Keystone Bridge Company, contractor, began the work of erecting the channel span of the Ohio River bridge Nov. 15 and expects to complete it in 15 days. The span north of the channel span is already in place, but the erection of the bridge south of the channel has not yet been begun.

The track southward from South Danville, Ky., is now laid to Fishing Creek in Pulaski County, about 36 miles, and work is still progressing steadily.

The Baltimore Bridge Company, contractor, has begun the work of erecting the superstructure of the bridge over the Kentucky River. There are three spans of 375 feet each, and the two piers are about 280 feet high from the bed of the river. The masonry is all done and the iron piers are being put up.

Railroad Men and the Yellow Fever Sufferers.

In answer to the appeal sent out by a meeting of railroad men, held at Atlanta, Sept. 26, and noted in the *Railroad Gazette* of Oct. 6, for contributions in aid of the Savannah and Brunswick yellow fever sufferers, Mr. W. D. Chipley, Chairman of the Committee, and Col. L. P. Grant, Treasurer, acknowledge the receipt of $1,174.60 from railroad men. On many roads the number of contributors has been large, and a greater amount would have been collected had it not been for the statement made public from Savannah that no more outside aid was needed.

Rochester & State Line.

Mr. Henry A. Taylor, the new contractor, has begun work with much energy. A large force is at work putting the graded sections of the road in order, and another force is employed on a heavy cutting in Gainesville, N. Y., which was not completed when work was suspended. About 500 tons of rails have been delivered at LeRoy, and 1,200 tons more are on the way. Several engines and a number of cars have been contracted for. Mr. Taylor has filed bonds in the sum required ($100,000) as security for his performance of the contract.

Boston, Winthrop & Point Shirley.

This company, whose method of organization was recently very severely criticised by the Massachusetts Railroad Commission, has, it is said, secured the 20 per cent. payment in actual cash on all subscriptions as required by law, and has also issued a call for the remaining 80 per cent. It is also said that work will be begun at once, and that the line will be laid with a third rail and connection made with the Eastern Railroad as with the Boston, Revere Beach & Lynn.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Chesapeake & Delaware Canal, at the office in Philadelphia, Dec. 4.

Erie, at the office in New York, Nov. 28, at 10 a. m.

Delaware, Lackawanna & Western.

It has been resolved to put up some additional arching in the new tunnel through Bergen Hill in order to secure entire safety from falling rock. This will take so much time that it is thought that the tunnel will not be opened for travel until after Jan. 1.

The strike of the employes in the Scranton shops still continues. A few of the men, who had returned to work on the company's terms, were attacked by a number of the strikers Nov. 14, and there was almost a serious riot. The company shows no signs of giving way, and the great body of the men seem to be equally determined.

Michigan Central.

The office of General Superintendent Ledyard has been removed from Detroit to Chicago.

Omaha & Republican Valley.

The track on this road is laid from Valley Station, Neb., on the Union Pacific, southward three miles, and the bridge over the Platte River was to be finished this week. The grading to Wahoo, the county seat of Saunders County, 18 miles from Valley, is to be finished this month and the track laid by Jan. 1. From Wahoo one line is projected to run westward, parallel with the Platte River, and another southwest to Lincoln, the capital of the State. Both lines will open a fine farming country, already well settled.

Lake Shore & Michigan Southern.

In the New York Supreme Court Nov. 14, application was made by Russell Sage, Rufus Hatch, and several others, most of them brokers in Wall street, who claim to own $4,000,000 stock of the company, for an order to compel the officers and transfer agents of the company to allow them to inspect the stock books. The complaint sets forth that they had been refused access to the books in question, and says also that they desired to obtain from them the names of the stockholders in order to communicate with them and secure united action to compel the officers of the company to put an end to the present railroad war. The Court granted a rule to show cause why the order asked for should not be issued.

Chicago, Dubuque & Minnesota.

The following statement of the Receiver is for the three months ending Sept. 30 and covers both the Chicago, Dubuque & Minnesota and the Chicago, Clinton & Dubuque roads:

	1876.	1875.	Inc or Dec.	P. c.
Earnings from freight.	$37,771 28	$52,855 19	Dec.. $15,083 91	28.5
Passengers	44.249 77	51,054 82	Dec.. 6,805 05	13.3
Other sources	5,854 08	3,786 32	Inc .. 1,867 76	49.2
Total earnings..	$87,875 13	$107,696 33	Dec.. $20,021 20	18.6
Working expenses	52,969 69	83,966 97	Dec.. 30,997 28	36.5
Renewals and insurance	10,062 64	... .	Inc .. 10,062 64	....
Total expenses..	$63,032 33	$83,966 97	Dec.. $20,934 64	24.6
Net earnings	$24,642 80	$23,729 36	Inc .. $913 44	3.8
Gross earn. per mile..	492 55	605 04	Dec.. 112 49	18.5
Net " " " ..	138 44	133 30	Inc .. 5 14	3.8
Per cent. working expenses	60.4	77.9	Dec.. 17.5	22.5
Per cent. all expenses.	71.9	77.9	Dec.. 6.0	7.2

The number of men employed has been cut down from 408 to 347, with a still larger decrease in the pay-rolls. The road has been maintained in good condition, but all unnecessary work has been stopped and everything possible done to secure economy in working.

Atchison, Topeka & Santa Fe.

This company's report for September on a mileage of 711 miles is as follows:

Freight earnings	$185,010 42
Passenger	73,780 36
Other sources	6,802 35
Total earnings ($374 per mile)	$265,593 13
Expenses (39.42 per cent.)	104,699 48
Net earnings ($226 per mile)	$160,893 65

As compared with September, 1875, when 563 miles were worked, the gross earnings show an increase of 80 and the net earnings of 81 per cent. For the nine months ending Sept. 30, on an average of 692 miles worked, the report is as follows:

Freight earnings	$1,157,826 97
Passenger	539,413 80
Other sources	61,144 27
Total earnings ($2,541 per mile)	$1,758,385 04
Expenses (49.64 per cent.)	862,736 89
Net earnings ($1,294 per mile)	$895,648 15

As compared with the same period in 1875, on an average of 514 miles worked, there is an increase of 77.8 per cent. in gross, and 64.2 per cent. in net earnings.

Tehuantepec.

Oct. 13 last the Mexican Senate disapproved of the contract which the Department of Public Works had made for the construction of this proposed railroad across the Isthmus of Tehuantepec. The company is an American one, having its headquarters in New York.

New York Central & Hudson River.

The old repair shops in Buffalo have been closed and the tools removed to the new shops in East Buffalo, which are thus described by the Buffalo *Commercial Advertiser:*

"The new structure is built of brick, in the form of a T, and is divided into four distinct departments, the whole having been built in just ninety days. The shops, however, are so admirably arranged as to form a harmonious whole, each being more or less dependent on its neighbor. They include the wood-shop, 180 by 80 feet; the machine-shop, 170 by 80 feet; the blacksmith-shop, 150 by 80 feet, and the repair-shop, 350 by 200 feet.

"In the wood shop may be found the planers, saws, mortising machines, and all the apparatus required for the large number of cars constantly awaiting repairs. The machines are of the most approved and recent patterns, and are so arranged that from the point where the material is first received to where it is finally finished and ready for use, none of it ever passes back, and no one person ever handles the same material twice.

"The admirably arranged machine-shop is supplied with some of the finest and most approved machinery of its kind to be found in the country, prominent among which are three wheel-boring machines, as they are called, each having a capacity of forty wheels per day. One of them is from the establishment of Bement & Co., of Philadelphia, while the remaining two are from the works of William Sellers & Co., of the same city. Here may also be found a one-hundred-ton hydraulic wheel-press, used in pressing new wheels and axles; also a pressure screw-press, having for its purpose the disengagement of old wheels from their axles, which object is satisfactorily accomplished at the rate of ten per hour. The axle-lathes, four in number, are models of workmanship, and by means of an improved pulley-block the workman is enabled to place the heavy iron axle either in the lathe or hydraulic press, as may be required. Two gear-lathes, for repairing tools, are a part of the fixtures; also two iron nut-tappers, each capable of tapping seven nuts, of unequal size, at the same time, together with a bolt-cutter, having a capacity of 2,000 per day.

"In the middle of the blacksmith shop, at convenient distances one from the other, are eight chimneys, to each of which is assigned four fires. There are, in addition, four fires on the sides, making 36 fires in all. For heavy work two improved Bradley's trip-hammers are nearly ready for use, and are believed, by those who pretend to know, to have nearly or quite the capacity of the more ponderous steam-hammer. A heavy pair of shears cuts iron from 1¼ to 6 in. in diameter. In another locality is a furnace for heating old iron in order that it may be straightened or shaped for some new purpose; and in another place is a bolt-cutter, with a furnace attached, designed for heating iron, preparatory to manufacturing the same into bolts. The working capacity of this machine is 4,000 bolts per ten hours. The air necessary to the rapid combustion of coal, which the various fires render necessary, is driven through galvanized pipes by two fans, one of which suffices for the bolt heater and heating-furnace, and the other for the blacksmith shop.

"Into the repair shop are drawn the cars requiring repairs, the number of tracks laid for the purpose being 17. The cars pass entirely through the shop, as doors are provided on either side. There is room for five cars on each of these 17 tracks, or 85 cars on all of them, a number sufficient for three long trains. Six turn-tables are located in the shop, to the end that car-wheels, axles, lumber, or anything required, may be promptly delivered at any desirable point. Similar tracks, and for a like purpose, are laid in all the other shops. Near the middle of this department a fire-wall has been constructed, so that, in case of a conflagration, a large portion of the building may be saved by reasonable exertion.

"The engines are two in number, each having a capacity of 80-horse power. Steam is generated in four boilers; each having twice the capacity of the engine, and can thus be used singly or combined. The engines, centrally located, are inclosed in massive glass cases, in order that the engineer may observe and answer signals promptly. Gongs, under the con-

trol of the engineer, are placed throughout the building for the purpose of guarding against accidents.

"The general office, 20 by 30 feet in size, is located up-stairs. It is approached by elevated walks from all points. The foreman is thus enabled to observe what is going on in every department of the concern, and may give or countermand orders at pleasure. As a whole, it is pronounced by good judges the model shop of the country. Everything, apparently, is just about as it should be. The whole structure, by means of its lavish skylights, is abundantly supplied with light, nor will a cloudy day occasion a dark corner. The work turned out by the various shops is finished in proportion as it advances, and is thus finally completed and delivered where required mainly by the aid of machinery. The broken-down car is drawn in from the east, but is found to be nearly or quite as good as new on passing through the opposite door on its way west. The place is well sewered and well ventilated. The different departments have a wash-room, and each man is provided with a towel and cupboard.

"Mr. W. H. Johnson, Jr., General Foreman of the works, and to whom our reporter is indebted for courtesies and the foregoing particulars, is the gentleman who mainly planned and arranged the machinery, of which we have given but an imperfect account.

"As we have before stated, the contractor for building the new shop was Joseph Churchyard. The job is one which reflects much credit upon him."

St Louis, Bloomfield & Louisville.

The work on this road is so far completed that trains can run safely between Bedford, Ind., and Springville. The tunnel at Owensboro is still unsafe, but work on it is in progress.

Ogdensburg & Lake Champlain.

The suit of this company against the Central Vermont for recovery of its road on account of failure to pay the rental was before the New York Supreme Court Nov. 2, and was then postponed to Nov. 27. It was ordered that the Receiver be continued in charge until that time.

Grayville & Mattoon.

Work on this road is being pushed on both sides of the river at Newton, Ill. Jasper County has paid up $50,000, the first installment of its subscription in aid of the road, and other county subscriptions will be paid up soon.

Petersburg.

The application for a receiver came up in the United States Circuit Court at Norfolk, Va., Nov. 10, and the hearing was, by agreement of counsel, postponed to Jan. 3 at Alexandria.

Vermont & Canada.

A new plan appears to be in contemplation for the settlement of the difficulties between this company and the Central Vermont. The St. Albans (Vt.) *Messenger* says: "Mr. Sowles, in the Senate, and Mr. Adams of Enosburgh in the House, Friday, introduced bills empowering the Vermont & Canada Railroad Company to purchase the franchise, notes, bonds, stock, etc., of the Vermont Central Railroad at private or public sale, and to run the Vermont Central as though built under the charter of the Vermont & Canada Railroad."

This action is probably taken in view of a possible foreclosure sale of the Vermont Central.

Rutland.

The Central Vermont Company, lessee, has lately been renewing the track of this road with rails taken from the Addison Railroad, also leased, the worn rails from the Rutland being put upon the Addison road. The rails taken up from that road were laid in 1870, but are very little worn, the traffic being very light. The Addison stockholders, however, do not like this treatment of their property and have applied to the United States Circuit Court for an injunction to restrain the lessee from removing any more rails and an order to compel the return of those already taken. They claim that the lessee, being merely a tenant, has no right to remove a valuable part of the property without their consent and replace it with inferior material.

Denver & Rio Grande.

The report for the Main Line (120 miles) for October is as follows:

Freight	$21,726 47
Passenger	13,467 11
Miscellaneous	75 00
Total ($277 per mile)	$35,268 58

Of this $1,119.60 was for mails and Government freight. As compared with October, 1875, there is an increase of $6,231.65, or 21.5 per cent. The earnings of the Trinidad Extension (86 miles) for the month were $14,719.12, or $171 per mile.

Intercolonial.

Mr. C. J. Brydges, General Superintendent of Government Railways, gives notice that he will receive until Dec. 11 tenders for the work required in connection with the construction of a deep-water terminus at St. John. Plans and specifications can be seen at the office of Mr. H. F. Perley, Engineer, at St. John, New Brunswick.

Chicago & Alton.

On the evening of Nov. 6 one of the piers of the bridge over the Mississippi at Louisiana, Mo., gave way, letting the two adjoining spans, each of 160 feet, down into the river. The pier is believed to have been undermined by the action of the current. The loss to the company is considerable. The work of replacing the pier and the two spans has been begun, and a transfer boat has been put upon the river to be used until the bridge is repaired. Trains are also run by way of the Hannibal bridge, using the St. Louis, Keokuk & Northwestern track from Hannibal to Louisiana.

Sunbury & Lewistown.

At a meeting of the bondholders in Philadelphia, Nov. 4, the committee reported that the road was offered for sale in accordance with the vote of the bondholders, who had bought it previously at foreclosure sale, on March 9. The bids were then run up to $153,000, when the property was withdrawn. It was again offered for sale on March 23, when it was sold for $151,000 to John K. Valentine, who paid cash for it. The Treasurer of the committee, after paying all claims, had left in his hands $11,254.31 for distribution, together with a claim for $8,000 against the Pennsylvania Railroad Company. The report was accepted and three bondholders chosen auditors to make the distribution.

The first-mortgage bonds amounted by the latest report to $1,200,000. The cash in hand will pay the bondholders just 93¾ *cents* on each $100 of bonds, or, if the claim against the Pennsylvania be collected, about $1.60½ on each $100, making no account of unpaid interest.

Elizabeth City & Norfolk.

A correspondent writes: "Mr. Jacob B. Billheimer, of the Elizabeth City & Norfolk Railroad, starts the engineers to survey the road on the 15th inst. The road is 40 miles long, 3 ft. 6 in. gauge, and will be completed by May 1, 1877."

Long Island.

In the matter of the application of certain stockholders for an injunction to restrain this company from completing the leases of the Flushing, North Shore & Central and the Southern railroads, the New York Supreme Court has denied a motion to continue the temporary injunction. The injunction was asked for on the ground that the leases in question would be detrimental to the interests of the Long Island stockholders, but the court held that the leases were legal and equitable.

South Branch.

The question of a county subscription to the stock of this company to secure its extension from Romney, W. Va., southward is being discussed in Hardy and Grant counties. The proposed extension would be about 24 miles long, from Romney to Moorfield. The road itself was graded and bridged in 1874 from Green Spring Run, on the Baltimore & Ohio, south to Romney, but nothing has been done upon it since.

Oil City & Clarion.

It is proposed to build a narrow-gauge railroad from Oil City, Pa., southeast to Clarion, about 25 miles.

Atlantic, Mississippi & Ohio.

Messrs. C. L. Perkins and Henry Fink, Receivers, give notice that they will pay on presentation at the office of Perkins, Livingston & Post, No. 23 Nassau street, New York, on and after Nov. 15, coupons on mortgage bonds of the Nortolk & Petersburg, the South Side and the Virginia & Tennessee companies which became due July 1, 1876; also coupons on Virginia & Tennessee funded interest bonds due at the same time. They will also pay at the same time and place the interest due July 1, 1876, on the funded interest notes of the Atlantic, Mississippi & Ohio Company.

Hannibal & St. Joseph.

The *Commercial and Financial Chronicle*, of Nov. 11, says: "The land-grant mortgage of this company, originally for $5,000,000, has been all paid with interest, except $159,000 of bonds, which are not returned, even upon an offer considerably above par, the money being in hand for their payment. This will leave the $4,000,000 of 8 per cent. convertible bonds outstanding next after the $3,000,000 of State 6 per cent. bonds loaned to the company by the State of Missouri. There remain about $2,500,000 of unpaid land notes, and 100,000 acres of land yet unsold, probably sufficient, if so applied, to pay the debt to the State. When these lands were granted to aid in the construction of the road, much of the country was a wilderness, and the land taken up under the grant was worth about $2.50 per acre. Now a string of thriving towns extends along the line, and the land grant is to be classed among the most successful that have been made."

Chicago & Southwestern.

This road was sold in Des Moines, Ia., Nov. 1, under the decree of foreclosure and was bought for $1,750,500 by the Iowa Southern & Missouri Northern Railroad Company, a new company lately organized chiefly for the purpose of making this purchase. The decree of foreclosure was made by the Chicago, Rock Island & Pacific Company, which leases the road, on the coupons which it had advanced the money to pay during the lease. The sale only transfers the right and property of the stockholders in the road and does not affect the first-mortgage bonds, whose holders have always received their interest from the lessee, and which still remain a lien on the road. The sale did not include the Atchison Branch, which is covered by a separate mortgage.

Illinois Central.

The Land Department reports for October sales of 920.28 acres for $5,860.09. The cash collected on land contracts was $10,178.95.

The Traffic Department reports earnings for October as follows:

	1876.	1875.	Decrease.	P. c.
In Illinois, 707 miles...	$542,433 17	$606,100 54	$63,667 37	10.5
In Iowa, 402 miles.....	176,306 77	210,407 61	34,100 84	16.2
Total 1,109 miles.	$718,739 94	$816,508 15	$97,768 21	12.0

The earnings were $767 per mile in Illinois, $439 per mile in Iowa, and averaged $648 per mile for the whole line.

Colchester.

About 150 men are employed on the grading of this road, which is to connect the town of Colchester, Conn., with the Boston & New York Air Line. The grading is more than half done, and the contractors expect to have the whole road ready for the iron by the end of the year.

South Mountain & Boston.

Work has been resumed on this branch at Swartswood and Papakating, N. J. The contract for building this road, as well as a large part of the South Mountain Railroad in Pennsylvania, of which it is to be an extension, has been let to John Lee, of Easton, Pa., who lately completed the Longwood Valley road. Mr. Lee is said to be a man of large means and an experienced contractor.

Paulinskill Valley.

The grading of this road is nearly completed from Blairstown, N. J., to Delaware Station, the principal work remaining to be done being a rock cutting near the latter place, which will probably be finished early in December. Some delay has been caused by a misunderstanding about the right of way through some property near Blairstown. A large and convenient frame depot is being built at Blairstown.

Cumberland & Piedmont.

It is reported, but on what grounds it is difficult to find out, that the Consolidation Coal Company is negotiating for the sale of this road to the Baltimore & Ohio Railroad Company. The road is the outlet of the Cumberland coal fields and is their only connection with other lines of transportation. The Baltimore & Ohio, or parties in its interest, has already a considerable amount of stock in the Consolidation Coal Company.

San Bernardino.

It is proposed to build a branch road from San Bernardino, Cal., to the Southern Pacific at Colton, the nearest point, about eight miles distant. A committee has been appointed to confer with the Southern Pacific managers, to see if they will assist in the construction of the road.

Pennsylvania Transportation Company.

The Oil City (Pa) *Derrick* of recent date says: "Gen. Herman Haupt, Chief Engineer of the Pennsylvania Transportation Company and the seaboard pipe line, has resigned his office, and is now engaged in visiting the agents in the several counties, for the purpose of ascertaining the indebtedness of the company for services in procuring releases. This checks all work on the seaboard pipe line, and it is not probable that any further efforts will be made in this direction, for the present at least."

The company is just now in financial difficulties, and the Pennsylvania Court of Common Pleas has appointed R. D. Fletcher, of Titusville, Pa., Receiver. It is claimed, however, that this trouble arises entirely out of transactions of the old company of the same name, and that it will not prevent the reorganized company from going on with its projected pipe lines to the seaboard.

Train Accidents in October.

On the morning of the 1st the engine of an express train on the Intercolonial Railway blew out one cylinder head while the train was near Bedford, N. S., delaying the train some time.

On the morning of the 1st a car of a freight train on the Pennsylvania Railroad was thrown from the track by a broken rail in the yard at Meadows, N. J. The car upset and was badly broken, killing a brakeman.

On the evening of the 1st a train on the Erie Railway, which was being run into the depot at Newburg, N. Y., by a flying switch, ran into an engine, which was just coming out of the house. The engine and a car were badly damaged, the conductor and two brakemen hurt.

On the morning of the 2d a mixed train on the Houston & Texas Central Railroad ran upon a wooden bridge over Little Elm Creek, near Corsicana, Tex., which was on fire and had the timbers partly burned through. The engine and ten cars broke through and were piled up together, and the wreck caught fire and was destroyed. The fireman was killed, the engineman and a brakeman hurt.

On the 2d the engine of a freight train on the Baltimore & Ohio road ran off the track near Bellton, W. Va., and was badly damaged.

On the 2d an accommodation train on the Intercolonial Railway ran off the track near Wellington, N. S.

On the morning of the 3d the engine and six cars of a freight train on the Erie Railway were thrown from the track by a misplaced switch near Susquehanna, Pa., blocking the road several hours.

On the evening of the 3d a mixed train on the Prince Edward's Island Railway struck a cow near St. Peter's Bay, P. E. I., and the engine and three freight cars were thrown from the track and badly broken. The engineman and fireman were hurt.

On the night of the 3d a freight train on the Intercolonial Railway ran into the head of another freight train which was just backing into a siding at Metapedia, P. Q., damaging both engines and blocking the road several hours.

On the night of the 4th an express train on the Great Western Railway was thrown from the track by the breaking of a wheel under the tender near Princeton, Ont. The engine and baggage car were badly wrecked, the engineman, fireman, baggageman and two express messengers killed.

On the 5th a freight train on the Portsmouth, Great Falls & Conway road ran off the track near Rochester, N. H., wrecking seven cars and blocking the road some time.

Late on the night of the 5th an express train on the Erie Railway struck a horse near Wellsville, N. Y., and was thrown from the track, the engine running up against a bank on one side of the track, the baggage car running off the road on the other, while two passenger cars were piled up on the engine and wrecked. The engineman was killed, the fireman and a brakeman fatally hurt, while two tramps, who were stealing a ride on the platform of the baggage-car, and eight passengers were less severely injured.

Very early on the morning of the 6th two engines sent out to bring in an extra train on the Wheeling, Pittsburgh & Baltimore road ran into the train which had been left standing on the main track at Mount de Chantal, W. Va., damaging some of the cars slightly. It is said that the track had been greased and the engines could not stop.

Early on the morning of the 6th there was a butting collision between a freight and an extra passenger train on the Indianapolis, Cincinnati & Lafayette road, near Greensburg, Ind. Both engines and three passenger cars were badly damaged, the passenger conductor fatally hurt and seven passengers less severely injured. The freight had had orders to lay over for the extra, but for some reason the conductor did not do so.

On the morning of the 6th a freight train on the St. Louis, Kansas City & Northern road ran off the track near St. Charles, Mo., killing the conductor and injuring a brakeman.

On the 6th a train on the Central Pacific road ran into a preceding freight train near Pleasanton, Cal., wrecking a caboose and three flat cars and injuring one man.

On the 7th a train on the New York Central & Hudson River road was thrown from the track by a misplaced switch at New Hamburg, N. Y.

Very early on the morning of the 8th there was a butting collision between two freight trains on the New Orleans, St. Louis & Chicago road, near Kenner, La. Both engines and several cars were wrecked and 12 cars were burned up. The accident was caused by a mistake in orders.

On the morning of the 8th the third section of a westbound express freight on the Pennsylvania Railroad ran into the rear of the second section at the Cambria switches, near Johnstown, Pa., damaging the engine and wrecking seven cars.

On the night of the 8th the boiler of an engine on the Savannah and Charleston road exploded at Ravenel, S. C., wrecking the engine and scalding the wood-passer slightly. The engine was standing at the depot at the time, while the engineman and fireman got their supper.

On the morning of the 9th a car of a freight train on the Hartford, Providence & Fishkill road ran off the track in Hartford, Conn., and was somewhat damaged.

On the 9th the engine of a passenger train on the Columbus, Chicago & Indiana Central road was thrown from the track near North Judson, Ind., by the breaking of a driving axle under the engine.

On the 9th an engine of the Intercolonial Railway ran off the track near Pictou, N. S., blocking the road five hours.

On the morning of the 10th a car of a freight train on the Hartford, Providence & Fishkill road ran off the track in Hartford, Conn., and was badly damaged, delaying the train an hour. A freight train had run off the track the previous day at the same place and about the same time.

On the 10th a freight train on the Boston & Maine road, near North Andover, Mass., ran into the rear of a preceding freight, wrecking the engine and four cars.

Late on the night of the 10th, on the Chicago, Burlington & Quincy track, five miles east of Quincy, Ill., a Toledo, Wabash & Western freight train broke in two and the two parts afterwards came together, breaking up and ditching 11 empty cars and disabling the tender. The road was blocked 10 hours.

Early on the morning of the 11th a freight train on the New York Central & Hudson River road was thrown from the track by a misplaced switch near Rome, N. Y. The engine was slightly damaged and four cars were piled up together and wrecked.

On the morning of the 11th a passenger train on the Oregon Central road ran off the track near Portland, Or., blocking the road some time.

On the morning of the 11th a train on the Boston & Providence road ran off the track in Roxbury, Mass., blocking the road an hour.

On the evening of the 11th there was a butting collision between two engines on the Ohio & Mississippi road, near Aurora, Ind., by which both engines were wrecked, one fireman killed, the other fireman and an engineman hurt.

On the evening of the 11th three cars of the market train on the Philadelphia & Baltimore Central road were thrown from the track by a misplaced switch at Chadd's Ford, Pa., and one of the cars upset.

On the morning of the 12th a freight train on the Western & Atlantic road ran into the rear of a mixed train which was stopping at Iceville, Ga. The caboose of the mixed train was wrecked, the passenger car damaged, and two passengers, who were trying to get off, were caught between the two cars and killed. The engineman on the freight is said to have been running too fast and without proper caution.

On the night of the 12th there was a collision between a freight and an express train on the Cincinnati, Hamilton & Dayton road near Brighton, O., by which several cars were damaged.

On the 12th three cars of a coal train on the Pennsylvania Railroad ran off the track in Elizabeth, N. J., delaying travel two hours.

On the night of the 12th an engine on the New York Central & Hudson River road ran through an open draw at Spuyten Duyvil, N. Y., and went into the river.

Early on the morning of the 13th the steamboat express on the Old Colony Railroad, drawn by two engines, ran into the head of a local freight which was just backing into a siding at Randolph, Mass. All three engines were badly broken, the freight engine being carried back 250 feet by the shock and having its boiler damaged and the passenger engines being both upset, the rear one carried over and past the forward one. The baggage car was wrecked and a second-class car thrown over a stone wall into a field. One fireman was killed and an engineman fatally hurt, an engineman, fireman and two passengers hurt. The accident was charged to the conductor of the local freight, who waited to do some switching instead of going on the siding at once. The passenger cars, which had Miller platforms, remained on the track and were not damaged.

On the afternoon of the 13th two flat cars in a freight train on the New York Central & Hudson River road ran off the track in Schenectady, N. Y., and several others were piled up on them, making a bad wreck.

On the afternoon of the 13th eight cars of a freight train on the Fitchburg Railroad were thrown from the track by a broken wheel at North Leominster, Mass., and four of them were wrecked, killing a lot of stock.

On the evening of the 13th a light engine used by the Superintendent of the Philadelphia & Reading road ran into the rear of a local passenger train at Limerick, Pa., doing some slight damage and injuring one person slightly.

On the morning of the 14th a coal train on the Richmond & Danville road ran into the head of a freight train which was stopping at Granite, Va., wrecking both engines and injuring a fireman. It is said that the fault was with the engineman of the coal train, who failed to see, or to obey a signal sent out to stop him.

On the 14th a car loaded with cotton in a train on the Chester & Lenoir road caught fire from some sparks from the engine when the train was near Gastonia, N. C., and was entirely destroyed.

On the 14th the engine and three cars of a freight train on the Portsmouth, Great Falls & Conway road were thrown from the track at South Berwick, Me., by a misplaced switch.

On the afternoon of the 14th as a construction train on the Western Counties Railway was running backwards near Church Point, N. S., three cars were thrown from the track by an iron bar which fell upon the rails. One man was killed and two injured.

On the night of the 14th a train on the South Carolina Railroad was thrown from the track at Seventy-five-mile Turnout, S. C., by a switch which had been purposely misplaced. The engine was damaged, five flat cars badly broken and the fireman hurt.

On the 16th a wild engine on the Toledo, Wabash & Western road ran into a passenger train on the Paris & Danville at the crossing of the two roads in Danville, Ill. The baggage car was upset and damaged and the mail agent hurt.

On the 16th a Chicago & Alton passenger train ran into an Ohio & Mississippi coal train at the crossing of the two roads in East St. Louis, Ill., wrecking several coal cars.

On the afternoon of the 16th three cars of a freight train on the Charlotte, Columbia & Augusta road were thrown from the track near Ward's, S. C., by the breaking of an axle. The road was blocked all night.

On the afternoon of the 16th a passenger train on the Concord & Claremont road ran off the track near Melvin's Mills, N. H., damaging the engine and several cars.

Very early on the morning of the 17th seven cars of a freight train on the St. Louis, Iron Mountain & Southern road were thrown from the track near Bismarck, Mo., and a brakeman was badly hurt.

On the evening of the 17th there was a butting collision between a passenger and a freight train on the Baltimore & Ohio road at Camden Junction, near Baltimore. Both engines were somewhat damaged and two trainmen were slightly hurt.

On the morning of the 18th a local train on the Philadelphia & Reading road ran into the rear of a coal train in Philadelphia, wrecking two coal cars.

On the 18th a passenger train on the Chicago, Rock Island & Pacific ran into the rear of a freight train near Bureau Junction, Ill. The engine and caboose were much broken and a fireman hurt. There was a thick fog at the time.

On the evening of the 18th a milk train on the Sussex Railroad was thrown from the track near Waterloo, N. J., by a loose wheel. A car was somewhat damaged as was also a bridge over which the train was passing at the time.

Late on the night of the 18th, 17 cars of a freight train on the Central Pacific road were thrown from the track by a broken rail near Pleasanton, Cal. Some of the cars were badly broken.

On the 19th, a freight train on the St. Joseph & Pacific road ran into a washed-out culvert near Wathena, Kan., and several freight cars were wrecked.

Early on the morning of the 20th, the engine and several cars of a freight train on the St. Louis, Iron Mountain & Southern road went through a bridge near Mill Spring, Mo., and were wrecked. Two of the cars were loaded with new engines for the Texas & Pacific. One of the trainmen and four tramps, who were stealing a ride, were hurt. The abutments of the bridge had been washed out.

On the afternoon of the 20th, there was a butting collision between two freight trains on the Louisville & Nashville road at Horse Cave, Ky. Both engines were badly damaged, an engineman and a brakeman injured. The accident is said to have been caused by a misunderstanding of orders.

On the night of the 20th a freight train on the Central Pacific road was thrown from the track by a land-slide near Sunol, Cal. The engine and several cars were wrecked and the engineman hurt.

On the night of the 20th the engine and two cars of a freight train on the New York & Canada road went through the open draw of the bridge over Lake George at Ticonderoga, N. Y., and were completely wrecked. It is said that the draw had been left standing open but the usual signals were not displayed.

On the 21st an express train on the Missouri, Kansas & Texas road was thrown from the track by the spreading of the rails near Parsons, Kan.

On the afternoon of the 21st three cars of a freight train on the Valley Branch of the Baltimore & Ohio road were thrown from the track near Woodstock, Va., by the breaking down of a flat car loaded with pig iron. The track was torn up for 300 yards and the conductor hurt.

On the evening of the 21st a car in a freight train on the Houston & Texas Central road caught fire from some sparks from the engine, when near Brenham, Tex., and four cars loaded with cotton were destroyed.

On the evening of the 21st a train on the Scioto Valley road struck a cow near Chillicothe, O., and the engine and baggage car were thrown from the track, the car being much damaged.

On the night of the 21st a Hartford, Providence & Fishkill train ran into the rear of a Providence & Springfield train which had started from the depot in Providence, R. I., but had stopped just outside. A car was somewhat damaged. Some person unknown had rung the bell on the Providence & Springfield train, causing the engineman to stop suddenly.

Very early on the morning of the 22d the engine of a freight train on the Georgia Railroad was thrown from the track near Sawdust, Ga., by a tie which was laying on the rails. The track was blocked all day.

On the morning of the 22d four cars of a freight train on the South Carolina Railroad were thrown from the track by a broken rail in Charleston, S. C, breaking several trucks and blocking the road six hours.

On the morning of the 22d a trestle on the Kentucky Central road at Catnip Hill, Ky., gave way under a freight train. Four cars went down and were wrecked and a tramp, who was stealing a ride, was killed.

On the 22d three cars of a freight train on the Texas & Pacific road were thrown from the track near Longview, Tex., by a defective rail joint and went down a high bank, killing a brakeman, injuring the conductor and two others.

On the 22d two cars of a stock train on the Pennsylvania Railroad ran off the track near New Brunswick, N. J. The cars were badly broken and several cattle killed.

On the 22d there was a butting collision between a freight train and a wild engine on the Cheshire Railroad near Keene, N. H., by which both engines were badly damaged and the engineman and fireman of the freight were killed. The wild engine was running on the freight train's time.

On the 23d an express train on the Pennsylvania Railroad ran over a misplaced switch and into the rear of a freight train which was standing on a siding at Bennington, Pa., breaking the engine and several cars badly.

On the 23d, near Adams' Basin, N. Y., on the New York Central & Hudson River road, there was a butting collision between a regular and an extra freight, by which both engines and 15 cars were damaged. The extra train should have waited for the other at a preceding station, but did not do so.

On the afternoon of the 23d the third section of an excursion train on the New York & Oswego Midland Railroad ran into the rear of the second section, which, for some unknown reason, had stopped on a curve near Sandburg, N. Y. Two cars of the second section were thrown down a high bank and wrecked, killing one passenger, injuring one fatally and seven others less severely. The second section had stopped and started again, having called in the flagman, when the bell-rope was pulled by some person unknown and the train stopped again, just as the third section came up.

On the night of the 23d nine cars of an excursion train on the Detroit & Milwaukee road were thrown from the track near Lowell, Mich., by the spreading of the rails. It is said that a number of spikes had been drawn purposely.

On the 24th the engine of an express train on the Baltimore & Ohio road ran off the track near Harper's Ferry, Va.

On the 24th a passenger train on the Mobile & Montgomery road ran into the rear of a freight train near Montgomery, Ala., wrecking the engine and four cars. The freight had sent back a flag, but the man did not go far enough.

On the evening of the 24th an engine on the Western Maryland road exploded its boiler at Union Bridge, Md., killing the engineman and injuring the fireman.

On the evening of the 24th a passenger train on the Central Railroad of New Jersey was thrown from the track by a misplaced switch at Evona, N. J. The engine was thrown to one side, the first passenger cars driven against the tender and the two following cars piled up on top of it and completely wrecked and the three following cars thrown from the track and damaged. A brakeman and a passenger were killed, three passengers fatally and 18 others less severely hurt. The switch had been opened and fastened back by driving in a wooden wedge, the rod being broken so that the signal light indicated a clear track.

On the 25th a steer broke through the end of a car on a train on the Toledo, Wabash & Western road, near Delphi, Ind., and fell upon the track, throwing six cars off, and damaging them a good deal.

On the 25th a freight train on the Winona & St. Peter road ran over some horses near Eyota, Minn., and the engine and four cars were thrown from the track, the engine being upset. The engineman was caught under the engine and badly scalded.

On the 25th as a construction train on the Chicago, Burlington & Quincy road was crossing a bridge near Sagetown, Ill., which was being repaired at the time, it gave way and the engine and five cars went through into the creek.

On the evening of the 25th the caboose of a wrecking train on the Kentucky Central road ran off the track at Shawhan's, Ky., and ran into a small building standing close by the track, demolishing it and killing a man who was in it.

Very early on the morning of the 26th, on the Ohio & Mississippi road, near North Vernon, Ind., there was a butting collision between two freight trains, by which both engines and 12 cars were wrecked and the road blocked some time. The west-bound train had the right to the road and the east-bound train should have waited for it, but for some reason did not do so.

On the 26th the way car on a freight train on the Savannah & Charleston road ran off the track at Ashepoo, S. C., delaying trains five hours.

On the evening of the 26th a passenger train on the Providence & Worcester road ran into some cars which had broken loose from a preceding freight train. The engine was damaged and several freight cars badly broken.

Early on the morning of the 27th a freight train on the Chicago, Burlington & Quincy road ran into the rear of a preceding freight, which had stopped for orders and was standing on the main track at Kirkwood, Ill. The caboose and seven freight cars were wrecked and the conductor hurt.

On the morning of the 27th, as a freight train on the New Jersey Midland Railroad was approaching the bridge over the Erie track at Hawthorne, N.J., the engine pushing several empty coal cars before it, one of these coal cars was thrown from the track by the dropping of the brake lever upon the rails. The other cars followed it and struck against the end of one of the bridge trusses, knocking it from its place, so that it fell down upon the Erie track below. The engine and 15 cars went down after it, the bridge and train being piled up between the abutments on the Erie track in a very bad wreck. The engineman and fireman were killed, the conductor and a brakeman badly hurt. The Erie track was blocked some 12 hours, the Midland of course until a temporary bridge could be built. The engineman was pushing the coal cars to a siding without detaching his train, contrary to rules.

On the morning of the 27th a local passenger train on the Boston & Maine road was thrown from the track near Scarboro, Me., by the breaking of a truck. Several cars were wrecked, two passengers badly and six slightly injured.

On the 27th the engine of a train on the Intercolonial road ran off the track near Stewiacke, N. S., blocking the track several hours.

On the evening of the 27th, two cars of a freight train on the Chicago, Burlington & Quincy road were thrown from the track in Aurora, Ill., by a loose wheel, blocking the track three hours.

On the 28th, the engine and four cars of a freight train on the Peoria, Pekin & Jacksonville road were thrown from the track by a misplaced switch near Jacksonville, Ill., the cars being badly broken.

Very early on the morning of the 29th, a freight train on the Chicago & Alton road ran into some cars which a preceding train had left at the foot of a heavy grade near Delavan, Ill. The engine and several cars were badly damaged.

On the afternoon of the 29th, as a freight train on the Ohio & Mississippi road was crossing a bridge near Delaware, Ind., an axle broke under a freight car and seven cars were thrown from the track, three going down into the creek.

Early on the morning of the 30th a construction train on the Columbus & Toledo road struck a freight train of the Cleveland, Columbus, Cincinnati & Indianapolis road at the crossing of the two roads in Delaware, O. The Columbus & Toledo engine was badly broken, seven cars were thrown from the track and badly broken. The Columbus & Toledo engineman was hurt.

On the morning of the 30th a freight train on the Michigan Central ran into the rear of a preceding freight at Dexter, Mich., damaging several cars. There was a thick fog at the time.

On the 30th a gravel train on the Boston & Providence road was thrown from the track at Canton, Mass., by a misplaced switch.

On the 30th an engine on the Cleveland, Mt. Vernon & Delaware road suddenly started out of the round-house at Akron, O., and ran into the turn-table pit, damaging itself considerably. The throttle valve is supposed to have been left open.

On the afternoon of the 30th a local train on the Philadelphia & Reading road ran into a shifting engine which was just backing into a siding at Columbia avenue, Philadelphia. Some little damage was done to the engines and cars and three passengers were slightly hurt.

On the night of the 30th as a passenger train on the Delaware, Lackawanna & Western road was stopping for water at Lehigh Summit, Pa., a coal train ran into its rear end completely wrecking one car and damaging five others. The wrecked car caught fire and was burned up. Three passengers were killed, two fatally and 11 less severely injured. The passenger train was a very long one, loaded with excursionists going to the Centennial, and was two hours behind time. It had started after taking water, when a coupling broke, causing further delay. The rear brakeman who had been sent back with a flag has not been seen since the accident. It is thought that he did not go back far enough.

On the morning of the 31st the engine of a train on the Atlantic, Mississippi & Ohio road exploded at Abingdon, Va., wrecking the engine completely, killing the engineman and fireman and injuring three persons who stood by. The steam-gauge, when found after the accident indicated 160 pounds of steam.

On the morning of the 31st the pay train of the Peoria & Rock Island road ran off the track near Milan, Ill., and both the engine and pay car upset. The engineman was badly and the fireman slightly hurt.

On the 31st a car in a freight train on the Pennsylvania Railroad was thrown from the track by the breaking of an axle near Trenton, N. J., delaying trains an hour.

On the 31st the engine and two cars of a mixed train on the Addison Branch of the Rutland Railroad ran off the track in Orwell, Vt., and went down a high bank. The engine and cars were wrecked and the engineman and fireman hurt. The accident was caused by a broken rail.

This is a total of 103 accidents, whereby 40 persons were killed and 115 injured. Twenty accidents caused death, 22 injury but not death, while 61, or 59.2 per cent. of the whole caused no injury serious enough for record.

These accidents may be classified as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	18	
Butting collisions	13	
Crossing collisions	3	
Unexplained	1	
		— 35
DERAILMENTS:		
Unexplained	20	
Misplaced switch	9	
Cattle on track	5	
Broken rail	4	
Broken bridge	4	
Broken axle	4	
Accidental obstruction	3	
Open draw	2	
Spreading of rails	2	
Loose wheel	2	
Broken wheel	2	
Wash-out	1	
Landslide	1	
Defective rail joint	1	
Broken truck	1	
Broken down car	1	
		— 62
Boiler exploded	3	
Cars burned while running	2	
Cylinder head blown out	1	
Total	103	

Seven collisions are recorded as resulting from mistake in or failure to obey orders; five from want of signals or failure to use them properly; two each from fog and from trains breaking in two; one each from a misplaced switch and from greased track. Two switches were purposely misplaced. Of the four broken bridges one was undergoing repairs, one had its timbers partly burned through, one had the abutments washed out, and the fourth, a trestle, apparently failed from weakness. Accidents directly resulting from defect or failure of road or equipment were 24 in number.

As compared with October, 1875, there is an increase of 15 in the number of accidents, of 28 in the number killed and of 41 in that injured.

The number of accidents is large, having been exceeded but twice during the year. The number of killed and injured is also large, but one month showing a larger number of killed, and two of injured. The number of collisions is still large, being about one-third of the whole, and the accounts indicate carelessness in the use of signals, especially in sending back flagmen to warn following trains. Broken rails, wheels and axles are in somewhat unusual proportion, but land-slides and wash-outs are few for the season of year, the month having been an extraordinarily dry one. The known cases of train-wrecking show a gratifying decrease, which appears, however, to be the result chiefly of greater watchfulness on the part of employes.

For the year ending with October the record is as follows:

	No. of accidents.	Killed.	Injured
November	87	24	97
December	84	12	62
January	60	8	29
February	91	15	68
March	109	30	95
April	56	6	47
May	64	13	116
June	52	19	73
July	79	17	69
August	78	22	76
September	106	41	133
October	103	40	115
Totals	969	247	980

The averages per day for the month were 3.32 accidents, 1.29 killed and 3.71 injured: for the year they were 2.65 accidents, 0.67 killed and 2.68 injured. The averages for the month are all much above those for the year. The average casualties per accident were for the month 0.388 killed and 1.117 injured; for the year 0.255 killed and 1.011 injured.